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I. AN EXPEDITION TO MOUNT MENUANG GASING, SELANGOR.

By HENRY N. RIDLEY, F.R.S., F.L.S.: *with an account of
the Journey by C. B. KLOSS.**

[Read 7th November, 1912.]

[MOUNT MENUANG GASING is 'Bukit Nyor' or 'Nuang' of local maps, one of the peaks of the range which forms the backbone of the Federated Malay States, and is situated within a mile of the spot where the boundaries of the States of Selangor, Perak, and the Negri Sembilan meet. It is 4,908 feet in height, and though separated on the north from the more massive portions of the main range by passes of 2,000 feet or so, it yet possesses a true mountain fauna:† south of it the range becomes gradually broken up into more or less isolated groups of hills, few of which attain an equal altitude; while only to those in the immediate neighbourhood is the high-level fauna known to extend.

The summit of Měnuang Gasing itself is a somewhat steep peak rising above hills of only slightly inferior altitude.

The collection, of which Mr. Ridley treats below, was made in the course of a four or five days' visit in February, 1912. At 6 o'clock one morning I left Dusun Tua (in the Ulu Langat district of Selangor, 17 miles from Kuala Lumpur), which is a rest-house near some hot springs impregnated with sulphuretted hydrogen, and at 5.45 P.M. made camp on a hill-side 2,950 feet high. The day's march had been an extremely hard one (owing to the many descents we had to make before finally attaining this altitude), and we all arrived thoroughly exhausted, but I felt little compunction in getting the utmost out of the Sakais who acted as carriers, since they had refused to remain with me for more than one night, and had stood out for most extortionate remuneration.

Our palm-leaf shelter was made on the mountain-side on a flat knoll which the Sakais called Bukit Pengaseh, and even at that moderate altitude we found the nights extremely cold owing to the presence of a strong wind which blew uninterruptedly across the ridge; at midday the thermometer generally indicated about 70°.

* Reprinted from the Journal of the Linnean Society—Botany, Vol. XLI. July, 1913

† An account of the mammals and birds obtained on a previous visit to these mountains appears in an earlier number of this Journal (Vol. iv pp 235-241 (1911)).

Save for the occurrence of "Job's Tears" (*Coix Lachryma Jobi*) at 1350 feet, and the commencement of the Giant Bamboo zone at 2000 feet, I noted little of botanical interest, as, after leaving the various streams which form the sources of the Langat River, attention was principally directed to a search for water. I remember, however, a most unexpected show of Cannas in a Saki clearing at 1,000 feet.

The collection was made between the camp and the top of Měnuang Gasing, about $3\frac{1}{2}$ hours distant to the N. W. along a very undulating track, which ran up and down hill-sides, along ridges, and over many minor summits, but nowhere reached as low a level as Bukit Pengaseh.

In two spots some distance apart, but both at an altitude of 4,100 feet, a yellow Balsam (*Impatiens oncidoides*) occurred, thickly covering swampy patches on the ridges, while I have rarely seen denser draperies of moss at a height of 4,300 feet than on a rocky hill-top covered with trees whose roots crawled over the surface; here orchids were numerous. At this height also we discovered a swamp and small pond on a level ridge which was deep in mud all along its length. Much of this mud was covered by a small-leaved creeping plant (*Pratia begoniæfolia*) which bore immense numbers of round pinkish-red fruits.

The ridges struck me as being unusually swampy, but the summit of Měnuang Gasing itself was quite dry, being of conical form; it had been cleared some years previously, and was covered principally with myrtles, pitcher-plants, and long grasses.

It will be seen that the plants obtained occurred at altitudes between 3,000 feet and 4,908 feet.—C. B. K.]

The Flora.

The collection of plants made by Mr. Kloss on this expedition and described below, shows clearly the fact that this mountain, possessing as he states a high-level fauna, bears also a high-level flora.

The mountain itself possesses an interest in that it is one of the most southern ones of anything like that altitude in the peninsula, and the flora we find thereon is shown by this collection to be similar to that of the central mountain chain running to the northern part of the peninsula. This is illustrated by the occurrence here of such plants as the beautiful Golden Balsam *Impatiens oncidoides*, *Bucklandia populnea*, the rare *Polyosoma parviflora*, *Pratia begoniæfolia*, *Dilochia Cantleyi*, and *Goodyera gracilis*.

Further south we have one mountain of approximately the same height, viz. Mount Ophir, 4,000 feet in altitude, the flora of which is now well known and is very different from that of the main chain and of Měnuang Gasing. Indeed,

there is every evidence that Mount Ophir was never connected with the main chain of the peninsula, or at least not during the period of the evolution of the flora now found on the mountains of the central main range.

The novelties and additions to our flora are mostly of peninsular types, but of more special interest are the Javanese Orchid, *Physurus humilis*, *Forrestia glabrata* (Indo-Malaya), and the Indian *Pratia begoniaefolia*, which, however, was recently obtained on Gunong Kerbau, in Perak; while among the new species, *Oberonia grandis*, probably the biggest species in this large genus, the remarkable *Blastus pulverulentus*, and the new *Balanophora* are the most noteworthy.

List of Plants collected.

POLYPETALÆ.

MAGNOLIACEÆ.

1. *ILLICIUM CAMBODIANUM*, Hance, in *Journ. Bot.* xiv. (1876) 240. [287]*

The flowers rather smaller than usual, and the petals not ciliate on the edge.

Distrib. Common on all the hills at about 4,000 feet elevation.

ANONACEÆ.

2. *GONIOTHALAMUS CURTISII*, King, in *Journ. As. Soc. Beng.* lxi. (1892) ii. 75 (*Mat. Fl. Mal. Pen.* i. 324) [287].

Distrib. Selangor and Perak.

3. *UNONA FILIPES*, Ridl., n. sp. [287].

Arbor 10-12-pedalis, glabra, cortice nigro. *Folia* elliptica, acuta, basibus rotundatis, tenuiter coriacea, superne viridia, subtus glauca, 19 cm. longa, 8 cm. lata, nervorum 15 paribus, petiolis 1 cm. longis. *Flores* singuli, axillares, kermesini vel brunnei, pedicellis filiformibus ad 38 cm. longis. *Sepala* parva, deltoideo-ovata, acuta, 3 mm. longa. *Petala* elongata, linearia, a basi latiore acuminata, ad apices spiraliter torta, angustissima, 15 cm. longa, ad basin 9 mm. lata. *Stamina* antheris oblongis apicibus late triangulariovatis. *Pistilla* lageniformia, dense pilis rufis tecta. *Carpella* matura ellipsoidea, 8 mm. longa, 5 mm. lata, brevissime apiculata, stipitibus 1 cm. longis.

Also in Perak (*Scortechini*, 342): Larut, 2,500 to 3,000 feet alt., 10 to 20 feet tall: flower brown, fruit glossy-green with brown tinge (King's Collector, 5291). Hill garden, medium-sized tree, flowers crimson (*Wray*, 609).

Figures in square brackets [] indicate the pagination of the original paper*

This plant is identified by King (*Mat. Fl. Mal. Pen. i.* 295) with *U. longiflora*, Roxb., a native of Assam and Chittagong. His description in this article and the description and figure in the 'Annals of the Calcutta Garden,' vol. iv. 1. p. 58, pl. 80, do not apply to the Perak plant, which appears to me to be a very distinct species. It differs in its very much longer and more slender pedicels, which in *U. longiflora* vary from 1½-8 inches in length and are much stouter; in its petals, which are much narrower, narrowing rather abruptly from a broader base into a long filiform point, whereas in *U. longiflora* they are gradually narrowed and linear lanceolate, much broader and only 9 cm. long or little more; in the carpels, which in *U. longiflora* are often moniliform, with the joints elongate and much longer in proportion to their breadth than in *U. filipes*.

4. *POLYALTHIA MONTANA*, *Ridl.*, n. sp. [288].

Arbor ramis tenuibus, cortice nigro, partibus junioribus pilis flavescentibus appressis tectis. *Folia* lanceolata, acuminata, apicibus obtusis, basibus brevius acuminatis, coriacea, nitida, subtus pallidiora, glabra, 15 cm. longa, 45 mm. lata, nervorum paribus 8, reticulationibus conspicuis tenuibus, petiolis pubescentibus 5 mm. longis. *Flores* extra-axillares, singuli, 1 cm. lati, pedicellis 1 cm. longis. *Sepala* parva, ovata, hirta. *Petala* oblonga, ovata, extus hirta, intus glabra, obtusa, serie externa quam interiore breviora. *Stamina* oblonga, connectivo subelliptico, apice canaliculato antheram vix tegente. *Ovaria* pauca, oblonga, hirta, stigmatibus glabris. *Ovulum* singulum. *Carpella* matura ellipsoidea, hirta vel pilis dejectis pustulata, 1 cm. longa, stipitibus 3 mm. longis.

Distrib. Ulu Langat (C. B. Kloss).

Nearest to *P. dumosa*, King, but differing in the venation of the leaves, the petals hairy outside and glabrous within, the connective or appendage of the stamen smaller, somewhat oblong, grooved along the top, and in the form of the fruit. Most of the flowers on the specimens appear to be unisexual and male, having no pistils. The petals appear to have been purple.

POLYGALACEÆ.

5. *POLYGALA VENENOSA*, *Juss. in Poir. Dict. Encyc. v.* 493 [288].

There are two forms in the collection, one the common peninsular form with broad ovate leaves, the other with oblanceolate leaves.

Distrib. Common in the hill-woods above 1,000 feet elevation.

STERCULIACEÆ.

6. *LEPTONYCHIA GLABRA*, *Turcz. in Bull. Soc. Nat. Mosc.* xxxi. (1858) 222 [288].

Distrib. Common all over the Peninsula.

RUTACEÆ.

7. GLYCOSMIS PENTAPHYLLA, *Correa*, in *Ann. Mus. Par.* vi. (1804) 384 [288].

Distrib. Common all over the Peninsula.

GERANIACEÆ.

8. IMPATIENS ONCIDIODES, *Ridl.* in *Kew Bull.* (1909) 11 [288].

Distrib. This beautiful Balsam seems to be abundant here. It occurs also in Perak and other parts of Selangor.

MELIACEÆ.

9. AGLAIA ODORATISSIMA, *Blume*, *Bijdr.* 171 [289].

Distrib. Common in the Peninsula and Sumatra and Java.

CELASTRINEÆ.

10. GLYPTOPETALUM QUADRANGULARE, *Prain*, ex *King* in *Journ. As. Soc. Beng.* lxxv. 11. (1895) 345 [289].

Distrib. Singapore to Perak.

SAPINDACEÆ.

11. ALLOPHYLUS COBBE, *Blume*, *Rumphia*, iii. 131 [289].

Var. GLABRA. In this form the leaflets are lanceolate to ovate-lanceolate, acuminate at both ends, entire, cuneate at the base, smooth, shining and papery when dry; the petioles, petiolules and rhachis of the inflorescence covered with short stiff hairs; the flowers rather more scattered on the rhachis than usual; the bracts short and the petals fringed with white hairs. I have seen no form exactly like it.

HAMAMELIDEÆ.

12. BUCKLANDIA POPULNEA, *R. Br. Wall. Cat.* n. 7414 [289].

Hills of Pahang and Perak.

Distrib. Himalayas, Burma, Java, Sumatra.

SAXIFRAGACEÆ.

13. POLYOSMA PARVIFLORA, *King*, in *Journ. As. Soc. Beng.* lxxvi. (1898) 11. 300 [289].

I have examined the co-type of this species in the Herbarium at Kew; a plant collected by Wray on Gunong Inas, in Perak. It is in young bud, and I have little doubt that the plant collected by Kloss on Měnuang Gasing is the same in spite of some differences in the original description. King describes the calyx-tube as narrow and nearly glabrous;

but in the type it is distinctly hairy. He gives the flowers as 0.2 inch long. In Kloss's plant, where they are fully open, they are just twice as long, and nearly glabrous, and the petals hardly as long as the anthers. These differences are due, no doubt, to the young state of Wray's plant.

Distrib. Hitherto only known from Gunong Inas.

MELASTOMACEÆ.

14. *SONERILA TENUIFOLIA*, Blume, in *Flora*, xiv. (1831) 491 [289].

Distrib. Common in the hills of the Peninsula, Sumatra, Java, and Borneo.

15. *BLASTUS PULVERULENTUS*, Ridl., n. sp. [290].

Frutex ramis tenuibus. *Folia* ovata, acuminata, basibus cuneatis, superne glabra, 13 cm. longa, 7 cm. lata, stellatim lepidota et glandulis copiosis munita, subtus nervis prominulis 3 ad basin connatis, petiolis 25 mm. longis. *Cyme* axillares vel subterminales, 3 cm. longæ, paucifloræ. *Bractea* lineares, 3 mm. longæ. *Flores* parvi, pedicellis 3 mm. longis. *Calycis* tubus subglobosus, lobis brevibus ovatis 4. *Petala* 4, ovata vix longiora, glabra. *Stamina* 4 æqualia et similia, filamentis petala æquantibus, antheris longioribus curvis acuminatis, basi processibus 2 brevibus obtusis munita. *Stylus* breviusculus, basi stellato-pilosus.

Distrib. Ulu Langat (C. B. Kloss).

This species is very different in appearance from our common *Blustus Cogniauxii*, Stapf, both in habit and larger flowers, and more resembles an *Anerincleistus*, but the four similar and equal stamens distinguish it from that and allied genera.

16. *MEDINILLA CLARKEI*, King, in *Journ. As. Soc. Beng.* lxi. (1900) II. 63 [290].

Distrib. Common on hills from 3,000 to 5,000 feet elevation. Malacca, Perak, Selangor.

17. *MEDINILLA HULLETTII*, King, l. c. 76 [290].

Distrib. Also occurs in Johore.

BEGONIACEÆ.

18. *BEGONIA MEGAPTEROIDEA*, King, l. c. lxxi. (1902) II. 65 [290].

Distrib. Perak.

19. *BEGONIA KLOSSII*, Ridl., n. sp. [290].

Rhizoma validum, repens, elongatum, lignosum. *Folia* longe petiolata, ovata, subabrupte acuminata, basibus rotundatis æquilateralibus, integra, 11.3 mm. longa, 5-6 cm. lata, in dorso furfuracea, aliter glabra, nervorum paribus 5 gracilibus,

petiolis gracilibus 18 cm. longis. *Pedunculus* e rhizomate erectus, subtenuis, ruber, 0.15 cm. longus, squamis lanceolatis acuminatis obtectus. *Flores* masculi 3-4, in pedicellis gracilibus 2 cm. longis. *Bractea* 2, lanceolatae, persistentes, 1 cm. longae. *Sepala* oblonga, subspathulata, apicibus rotundatis, 14 mm. longa, 5 mm. lata. *Petala* angustiora et breviora. *Andræcium* sessile, filamentis gracilibus, dimidio antheræ æquilongis, antheris linearibus obtusis haud apiculatis. *Cap-sula* trialata, ala una longiore oblonga oblique rotundata, ad apicem 2 cm. longa 1 cm. lata, alis obtuse triangularibus 5 mm. longis.

The flowers apparently white. This is allied to *B. Robinsonii*, Ridley; but the leaves are quite equilateral and not bilobed. It evidently creeps on tree trunks as does that species, as one specimen shows roots spread out from the rhizome with moss on them.

ARALIACEÆ.

20. *BRASSAIOPSIS ELEGANS*, Ridl., n. sp. [291].

Frutex cortice griseo, partibus junioribus tomento rufo-tectis. *Folia* digitata vel simplicia, foliolis lanceolatis acuminatis, basibus longe angustatis, marginibus minute denticulatis, herbacea, subtus pallidiora, 16 cm. longa, 4-5 cm. lata, nervorum 5 paribus, petiolulis 3 cm. longis, petiolis 13 cm. longis gracilibus. *Stipula* connatae, latæ, bidentatae, dentibus acuminatis. *Panicula* longa, laxa, deflexa, gracilis, pedunculo gracili 10 cm. longo cum ramis 4-12 cm. longis rufo-tomentoso, umbellis 1 cm. longis 13-floris, pedicellis florum 5 mm., fructuum 1 cm. longis. *Bractea* lanceolatae, acuminatae, 3 mm. longae, umbellares breviores apicibus brevioribus, omnes rufo-tomentosae. *Calyx* obconicus, dentibus brevibus rufo-tomentosus. *Petala* 5, oblonga, obtusa, parce hirta. *Stamina* 5, brevia, filamentis brevibus, antheris oblongis obtusis. *Stylus* unicus, brevis, crassus, in flore quam stamina brevior, stigmate capitato. *Discus* pulviniformis. *Ovarium* biloculare.

Distrib. Ulu Langat.

This species is allied to *B. speciosa*, DC. & Planch., but is very distinct in its much smaller, more slender inflorescence, and longer peduncles.

RUBIACEÆ.

21. *ADENOSACME LANCEOLATA*, Ridl. in *Journ. Fed. Mal. States Mus.* iv. (1909) 29 [291].

Distrib. Also in Pahang.

22. *ARGOSTEMMA INVOLUCRATUM*, Hemsl. in *Hook. Ic. Pl.* t. 1556 [291].

Distrib. Perak, Pahang.

23. ARGOSTEMMA SPINULOSUM, Clarke, in Hook. f. Fl. Brit. Ind. iii. 46 [291].

Distrib. Also Perak.

24. ARGOSTEMMA HOOKERI, King, in Journ. As. Soc. Beng. lxxii. (1903) II. 155 [291].

Distrib. Also Johore, Penang.

25. OPHIORRHIZA ERUBESCENS, Wall. Cat. n. 6233 [291].

Distrib. Burmah, Perak.

26. OPHIORRHIZA KLOSSII, Ridl., n. sp. [291].

Herba pedalis (30 cm. alta), caule validulo basi glabro, superne velutino-pubescente. *Folia* ovata vel oblongo-lanceolata, acuminata apice obtusa, basi acuminata, glabra nervis in dorso pubescentibus exceptis, superne viridia, subtus pallida, 115 mm. ad 15 cm. longa, 43 mm. lata, nervorum paribus ad 14 in nervum submarginalem junctis, petiolis pubescentibus 35 cm. long *Stipulae* lineares, 5 mm. longæ. *Cynæ* compactæ, nutantes, deflexæ, pubescentes, 1 cm. longæ. *Bractæ* persistentes, lineares, dimidio pedunculi æquales. *Pedicelli* breves, pubescentes, ovario breviores. *Calyx* globoso-cupulatus, pubescens, lobis 5 ovatis acutis dimidio tubi æquantibus. *Corolla* tubulosa, crassiuscula, 6 mm. longa, glabra, apicibus paullo pubescentibus exceptis, lobis obtusis $\frac{1}{2}$ tubi æquantibus. *Stamina* 5, glabra, quam corolla breviora, antheris linearibus. *Stylus* longior, stigmate bifido. *Capsula* obreniformis, sinu lato profundo, pubescens, 8 mm. lata, ad sinum 1 mm. alta.

A very distinct species in its rather large flowers in the nodding head, the persistent bracts and the broad linear stipules.

27. KLOSSIA MONTANA, Ridl. in Journ. Fed. Mal. States Mus. iv. (1909) 28 [292].

Distrib. Selangor and Pahang.

28. WEBERA PULCHRA, Ridl. l. c. 33 [292].

The leaves are rather smaller than in the type.

Distrib. Pahang.

29. IXORA KINGSTONI, Hook. f. Fl. Brit. Ind. iii. 140 [292].

Distrib. Johore, Selangor, Perak, Malacca, and Andamans.

30. PAVETTA INDICA, Linn. Sp. Pl. 110 [292].

Distrib. Whole Peninsula.

31. LASIANTHUS WIGHTIANUS, Hook. f. Fl. Brit. Ind. iii. 188 [292].

Distrib. Mt. Ophir.

32. *LASIANTHUS FLAVICANS*, King & Gamble, in *Journ. As. Soc. Beng.* lxxiii. (1904) II. 116 [292].

Distrib. Singapore, Pahang, Perak, and Selangor.

33. *PSYCHOTRIA STIPULACEA*, Wall. in *Roxb. Fl. Ind. ed. Carey*, iv. 164 [292].

Distrib. Common over the whole Peninsula.

COMPOSITÆ.

34. *GYNURA SARMENTOSA*, DC. *Prodr.* iv. 298 [292].

Distrib. Whole Peninsula, Siam, and Malaya.

35. *ADENOSTEMMA VISCOSUM*, Forst. *Char. Gen.* 20 [292].

Distrib. Common, especially in hill-districts.

CAMPANULACEÆ.

36. *PRATIA BEGONIÆFOLIA*, Lindl. *Bot. Reg.* t. 1373 [293].

Distrib. Only previously met with in Gunong Kerbau in Perak, and in India.

VACCINIACEÆ.

37. *VACCINIUM BREVIFLOS*, Ridl., n. sp. [293].

Frutex. *Folia* coriacea, oblanceolata, versus apicem abrupte acuminatum latiora, ad basin angustata, 4 cm. longa, 2 cm. lata, glabra, superne pallida, subtus brunnea (in sicca), nervis 6 ascendentibus, petiolis 4 mm. longis. *Racemi* axillares et subterminales, breves, 2 cm. longi vel minores, rachi et pedicellis pubescentibus, ad bases floriferi. *Bractea* ovata, subacuta, 4 mm. longæ. *Calyx* cupuliformis, margine integro. *Corolla* extus glabra, cylindrica, lobis brevissimis recurvis rotundatis, 5 mm. longa. *Stamina* breviora 10, filamentis brevibus hirtis. *Anthera* parvæ, oblongæ, rostris oblongis truncatis ferme æquilongis parallelis, processibus basalibus nullis. *Stylus* crassiusculus, ad basin hirtus, superne glaber, quam corolla brevior, stigmate capitato. *Discus* pulviniformis.

This species somewhat resembles *V. Kunstleri*, but is in all parts much smaller.

MYRSINÆ.

38. *LABISIA PUMILA*, var. *ALATA*, Scheff. *Myrs.* 93 [293].

Distrib. Common in the Peninsula, Borneo, and Sumatra.

39. *ARDISIA ANDAMANICA*, Kurz, *For. Fl.* ii. 108 [293].

Distrib. Andamans and Mergui, south to Johore.

STYRACEÆ.

40. *SYMPLOCOS SPICATA*, var. *MALASICA*, C. B. Clarke, in *Hook. f. Fl. Brit. Ind.* iii. 573 [293].

Distrib. Malacca and Perak.

OLEACEÆ.

41. *JASMINUM ADENOPHYLLUM*, Wall. *Cat.* n. 2876 [293].

Distrib. Apparently a rare plant, only obtained in the Khasiya hills (Wallich) and by Kunstler in Penang.

APOCYNACEÆ.

42. *RAUWOLFIA PERAKENSIS*, King & Gamble, in *Journ. As. Soc. Beng.* lxxiv. (1908) II. 424 [293].

Distrib. Perak and Pahang.

ASCLEPIADEÆ.

43. *DISCHIDIA COCCINEA*, Griff. *Notul.* iv. 45 [294].

Distrib. Malacca, Perak.

44. *DISCHIDIA ACUTIFOLIA*, Maing. ex Hook. *f. Fl. Brit. Ind.* iv. 51 [294].

Distrib. Malacca.

GESNERACEÆ.

45. *AGALMYLA STAMINEA*, Blume, *Bijdr.* 767 [294].

Distrib. Hills of the Malay Peninsula, Java, Sumatra.

46. *ÆSCHYNANTHUS LONGICALYX*, Ridl. in *Journ. Str. Br. As. Soc.* xliii. 16 [294].

Distrib. Perak and Selangor.

47. *DIDYMOCARPUS HISPIDUS*, var. *SELANGORENSIS*, Ridl. *apud. King & Gamble, in Journ. As. Soc. Beng.* lxxiv. (1909) II. 750 [294].

Distrib. Selangor.

48. *CYRTANDROMÆA ACUMINATA*, Benth. & Hook. *f. Gen. Pl.* ii. 1020 [294].

Distrib. Malay Peninsula from Tringanu southwards to Selangor.

49. *CYRTANDRA PILOSA*, Blume, *Bijdr.* 770 [294].

Distrib. Malay Peninsula to New Guinea.

ACANTHACEÆ.

50. *STROBILANTHES MAINGAYI*, C. B. Clarke, in *Hook. f. Fl. Brit. Ind.* iv. 448 [294].

Distrib. Penang, Perak, Selangor.

51. *PSEUDERANTHEMUM LILACINUM*, Stapf, in *Bot. Mag.* t. 8446 [294].

Distrib. Johore.

52. *PSEUDERANTHEMUM PARVIFLORUM*, Ridl., n. sp.

Suffrutex, glaber. *Folia* late lanceolata, herbacea, utrinque acuminata, subtus pallida, 19 cm. longa, 7 cm. lata, nervorum 11 paribus, petiolis 1 cm. longis. *Panicula* 15 cm. longa, rachi pubescente. *Bractea* breves, 1 mm., lineares, acuminatae. *Pedicelli* breves, vix 1 mm. longi. *Sepala* hirta, linearia, acuminata, 1 mm. longa. *Corolla* 1 cm. longa, crassiuscula, hirta, versus medium gradatim dilatata; labium superius lanceolatum, apice bifido, lobis lateralibus sublanceolatis angustioribus; labium inferius longius, carnosulum, lanceolatum, omnino parce hirtum. *Stamina* 2, antheris in dorso hirtis, loculis haud parallelis inaequalibus, basibus mucronulatis. *Stylus* glaber. *Capsula* 3 cm. longa, pedicellata, apice magno dilatato acuto 7 mm. lato. *Semina* 4, complanata, rugosa.

Allied to *P. breviflos* (C. B. Clarke) Ridl., but differing in foliage and habit.

53. *LEDA LANCIFOLIA*, Ridl., n. sp. [295].

Suffrutex, cortice pallido. *Folia* lanceolata, acuminata, basibus longe cuneatis, æqualia, herbacea, 12 cm. longa, 5 cm. lata, superne glabra, subtus in nervis minute scabro-hirta, nervorum circiter 10 paribus tenuibus, petiolis 1 cm. longis. *Panicula* terminalis, 6 cm. longa, ramis paucis patulis, pauciflora. *Bractea* lineares, 4 mm. longæ. *Sepala* linearia, acuminata, acuta, 5 mm. longa, glabra. *Corolla* 15 mm. longa, lobis labii superioris lanceolatis, inferioribus obtusis, lobo medio pilis flavis munito. *Stamina* 2, antheris hirtis muticis subparallelis.

A single specimen with only one corolla remaining, but enough to show that the plant belongs to the genus *Leda*, as separated by C. B. Clarke, and that it is specifically distinct from any other species. The inflorescence is open and spreading, with a few branches and about 7 flowers on short pedicels 2–5 mm. long. The whole of the leaves and panicle dries black.

APETALÆ.

NEPENTHACEÆ.

54. *NEPENTHES GRACILLIMA*, Ridl. in *Journ. Linn. Soc. Bot.* xxxviii. (1908) 320 [295].

Apparently a large-sized form of this species, but without flowers.

Distrib. Pahang and Selangor.

PIPERACEÆ.

55. *PIPER MAGNIBACCUM*, C. DC. in *Records Bot. Surv. Ind.* vi. 5 [295].

Distrib. Perak.

56. *PIPER CANINUM*, Blume, in *Verh. Batav.-Gen.* xi. (1826) 214. f. 26 [295].

The pubescent form, with ovate, nearly cordate leaves.

Distrib. Common all over the Peninsula.

57. *PIPER MURICATUM*, Blume, *Cat. Gew. Buitenz.* 33 [295].

Distrib. Common in forest in the Peninsula.

CHLORANTHACEÆ.

58. *CHLORANTHUS BRACHYSTACHYS*, Blume, *Fl. Jav. Fasc.* viii. 13, 14 [295].

Distrib. Common on hills, India, China, and Malaya.

MYRISTICACEÆ.

59. *MYRISTICA CANTLEYI*, Hook. f. *Fl. Brit. Ind.* v. 110 [296].

A large-leaved, nearly glabrous form.

Distrib. Malay Peninsula.

LAURACEÆ.

60. *LITSEA CINERASCENS*, Ridl., n. sp. [296].

Arbor, cortice ramulorum pallide griseo. *Folia* lanceolata, acuminata, basibus attenuatis obtusis, alterna vel subopposita, tenuiter subcoriacea, superne glabra, subtus cinerea, 21 cm. longa, 5-6 cm. lata, costa nervisque 11-jugatis minute rufo-tomentosis, petiolis crassiusculis tomentosis 5 mm. longis. *Flores* feminei in pedunculis brevissimis, 2 mm. longis, bracteis ovatis lanceolatis tomentosis minimis. *Pedunculi* umbellarum tomentosi, 4-5 mm. longi. *Bractee* involucrales 4, ovatae, acutae, extus sericeae. *Umbellulae* 3 in pedunculis crassiusculis sericeis, 3 mm. longae. *Sepala* 6, oblonga, obtusa, extus sericea. *Staminodia* exteriora 6, filamentis longiusculis sericeis, antheris abortivis, interiora 3-breviora, exterioribus ad bases adnata, spathulata, glandulis reniformibus 2 ad basin sessilibus. *Ovarium* parvum, ovoideum, glabrum. *Stylus* filiformis, stigmate peltato-discoideo sublobato. *Flores* masculi et fructus non visi.

Distrib. Also met with at Telom, Pahang (Ridley, 13781).

Litsea cinerascens seems nearest to *Litsea amara*, Blume, but is much more glabrous than any form of this species, with fewer flowers in the umbels and larger leaves. Gamble, in the

'Materials for a Flora of the Malay Peninsula,' gives the Telom plant under the variety *attenuata* of *L. amara*, but it is very different from the other plants included under that variety, and should have at least a varietal name.

THYMELÆACEÆ.

61. *DAPHNE PENDULA*, Sm. *Ic. Ined.* ii. 34, t. 34 [296].

Distrib. This pretty shrub is not rare in the hill woods of the Malay Peninsula, Burma and Malaya.

BALANOPHORACEÆ.

BALANOPHORA TRUNCATA, Ridl., n. sp. [296].

Rhizoma arcte pustulosum. *Folia* ad basin pedunculi 3, ovato-oblonga, apicibus rotundatis vel emarginatis, 5-15 mm. longa, 9-10 mm. lata, summa 2, oblonga, majora, truncata, 2 cm. longa, 1 cm. lata. *Pedunculus* masculus 7 cm. longus, basi ad 3 cm. nudus, 3 mm. crassus. *Flores* in spica dissiti, circiter 30, sessiles. *Alabastra* transversim oblonga. *Sepala* 2, exteriora transverse oblonga, 4 mm. lata, multo breviora; interiora lineari-oblonga, apicibus incurvis, exterioribus æquilongia, 1 mm. lata. *Andræcium* transverse oblongum, 3 mm. latum, antheris plurine dense congestis, serie una.

The solitary specimen in the collection is a male inflorescence with the leaves and a small part of the rhizome attached. It has no trace of female flowers, and evidently belongs to an unisexual species, such as *B. Polyandra*, Griff., which, however, is a very much larger plant. It is quite distinct from this in the very unequal and dissimilar sepals, the upper and lower ones being much wider and quite truncate, with a long straight edge at the apex.

EUPHORBIACEÆ.

63. *SAUROPUS FORCIPATUS*, Hook. f. *Fl. Brit. Ind.* v. 334 [297].

Distrib. Hill woods of the Malay Peninsula.

64. *ANTIDESMA PENDULUM*, Hook. f. *l. c.* v. 356 [297].

Distrib. Perak.

URTICACEÆ.

65. *ELATOSTEMMA ACUMINATUM*, Brongn. *Bot. Voy. Coq.* III [297].

Distrib. Not rare by mountain streams in the Peninsula.

66. *FICUS SUBULATA*, Blume *Bijdr.* 460 [297].

Distrib. Malay Peninsula and Islands.

ORCHIDEÆ.

67. OBERONIA (§ CAULESCENTES) GRANDIS, *Ridl.*, n. sp. [297].

Caules plures, pedales. *Folia* ensiformia, curva, acuminata, 15—17 cm. longa, 15 mm. lata. *Spicæ* terminales, 15 cm. longæ, ad basin densifloræ, floribus flavidulis subverticillatis. *Bractææ* lanceolatae, cuspidatae; pedicelli 1 mm. æquantes. *Sepala* ovata, acuta. *Petala* oblonga, lanceolata, integra, angustiora. *Labellum* oblongo-obovatum, apice bifido marginibus breviter denticulatis, fovea ovata. *Anthera* late ovata, subrostrata. *Capsula* 5 cm. longa, oblongo-globosa.

Ulu Langat.

A very large-sized species, with stems a foot to 18 inches long or more, including the spike, and with about six long curved leaves, scimitar-shaped. Spikes not very crowded, but flowering to the base. Flowers 2 mm. across, apparently yellow. The sepals short and broad, and the lip resembling that of *O. biaurita*, Hook. f.

68. LIPARIS FLACCIDA, *Reichb. f. in Linnæa*, xli. (1877) 45 [297].

In fruit only.

Distrib. Siam, Malacca, Perak, Selangor, and Malay Islands.

69. LIPARIS COMOSA, *Ridl. in Journ. Linn. Soc., Bot.* xxxii. (1896) 229 [298].

Distrib. Perak.

70. ERIA (§ DILOCHIOPSIS) SCORTECHINII, *Hook. f. Fl. Brit. Ind.* v. 809 [298].

Distrib. Hills of Perak and Pahang, at about 4,000 feet elevation.

71. PHREATIA (§ BULBOSÆ) LINEARIS, *Ridl.*, n. sp. [298].

Rhizomu 4 cm. longum, dense pseudobulbis et radicibus tectum. *Pseudobulbi* globoso-conici, 1 cm. longi. *Folia* 2-3 anguste linearia, obtusa, 11 cm. longa, 5 mm. lata, coriacea, basi in petiolum angustata. *Scapus* gracilis, 16 cm. longus, basi ad dimidium nudus, foliis caulinis circiter 4, lanceolatis acuminatis 10 mm. longis exceptis. *Flores* minimi, subremoti. *Bractææ* anguste lanceolatae, subulatae, 2 mm. longæ. *Ovarium* cum pedicello longius quam bractææ. *Sepala* ovata. *Petala* angustiora, oblonga, subacuta. *Labellum* ovatum, haud unguiculatum, integrum, obtusum, quam sepala brevius.

Ulu Langat.

Very near, if not identical, is a plant collected by Beccari on Mt. Singalan, Sumatra, No. 397 (*Herb. Kew.*).

This plant most resembles *Ph. listrophora*, Ridl.; the lip is, however, not clawed but ovate, like that of *Ph. minutiflora*, Lindl.

72. *CERATOSTYLIS GRACILIS*, Blume, *Bijdr.* 306 [298].

Distrib. Common all over the Peninsula.

73. *CERATOSTYLIS LANCIFOLIA*, Hook. f. *Fl. Brit. Ind.* v. 826 [298].

Distrib. Apparently rare, having only previously been collected by Scortechini in Perak.

74. *CALANTHE VERATRIFOLIA*, R. Br. in *Bot. Reg.* sub t. 573 [298].

Distrib. Johore and Perak, India, Malay Islands to Australia.

75. *CÆLOGYNE CARNEA*, Hook. f. *Fl. Brit. Ind.* v. 838 [298].

Distrib. Pahang, Selangor, Perak. Common at high altitudes.

76. *DILOCHIA CANTLEYI*, Ridl. in *Journ. Linn. Soc., Bot.* xxxii. (1898) 332 [298].

Distrib. Perak and Pahang, at high altitudes.

77. *PLOCOGLOTTIS JAVANICA*, Blume, *Bijdr.* 381, t. 21 [298].

Distrib. Common all over the Peninsula, Java.

78. *SACCOLABIUM BIGIBBUM*, Hook. f. *Bot. Mag.* 5767 [298].

Distrib. Burmah, Perak, and Pahang.

79. *THRIXSPERMUM MONTANUM*, Ridl., n. sp. [298].

Caulis validus, 15 cm. longus, 6 mm. latus. *Folia* coriacea, lorata, obtusa, 15 cm. longa, 2 cm. lata. *Pedunculus* 45 mm. longus. *Racemus* 15 mm. longus, pauciflorus, vix incrassatus, compressus, bracteis ovatis acutis. *Flores* ad 7, pedicellis 4 mm. longis. *Sepala* oblonga, lanceolata, subacuta. 6 cm. longa, 4 cm. lata. *Petala* angustiora, lanceolata, subfalcata. *Labellum* saccatum, unguiculatum, lobis vix distinctis brevibus truncatis, lobo medio rotundato brevi, calcare conoideo porrecto obtuso. *Columna* brevis, lata, clinandrio late ovato, rostellis lobis brevibus obtusis. *Anthera* ovata, rostro lato truncato-quadrato, pollinibus oblongis obtusis, stipitibus brevibus, disco minuto ovato.

Ulu Langat.

Not very like any species known to me. The lip has a saccate base and the margins are elevated, ending in two short blunt points representing the side lobes; between these at the end is a short rounded lobe representing the mid-lobe, the

spur is conic as in *Th. Calceolus*. The pollinia seem to be sausage-shaped rather than pyriform. The clinandrium is large for the flower, with distinct thick projecting margins.

80. *PODOCHILUS LANCIFOLIA*, Schlecht. Mon. Pod. 12 [299].

Distrib. Selangor and Perak.

81. *GOODYERA GRACILIS*, Hook. f. Fl. Brit. Ind. vi. 112 [299].

Var. *UNICALLOSA*, Ridl., n. var.

Flores $\frac{1}{2}$ poll. longi. *Labellum* oblongum, cymbiforme, lobo terminali cordato-ovato, callo singulo oblongo, apice rotundato obtuso. *Anthera* longior, magis acuminata, polliniis elongatis pyriformibus, disco lineari ultra dimidium pollinii longo.

This has the exact habit of *G. gracilis*, Hook f., a native of the upper part of the Larut Hills, near Gunong Hijan. I find, however, that the two calli in the base of the lip are connate into one blunt thick round-tipped organ, and that the pollinia are longer and narrower, with the linear disc more than half as long as the pollen-mass.

82. *PHYSURUS HUMILIS*, Blume, Orchid. Arch. Ind. 96, pl. 27. 2, 12-13 [299].

A single specimen.

Distrib. New to the Malay Peninsula. Native of Java.

83. *CRYPTOSTYLIS ARACHNITES*, Blume, Orch. Arch. Ind. 132, t. 45 [299].

Distrib. Common up to about 4,000 feet in the Malay Peninsula, India, Java, Ceylon.

84. *HABENARIA ZOSTEROSTYLOIDES*, Hook. f. Fl. Brit. Ind. vi. 155 [299].

Distrib. Malacca, Perak, and Pahang.

85. *HABENARIA GIGAS*, Hook. f. l. c. 160 [299].

Specimen in fruit only, and so doubtful.

Distrib. Perak.

SCITAMINEÆ.

86. *GLOBBA REGALIS*, Ridl. in Journ. Fed. Mal. States Mus. iv. (1909) 74 [300].

Base of stem blood-spotted.

Distrib. Pahang.

AMARYLLIDEÆ.

87. *CURCULIGO LATIFOLIA*, Ait. Hort. Kew. ed. 2, ii. 253 [300].

Distrib. Burmah, Andamans, Malaya.

LILIACEÆ.

88. *PELIOSANTHES ALBIDA*, *Baker, Bot. Mag. t. 7110* [300].

Distrib. Perak, Penang, and Borneo.

89. *SMILAX ASPERICAULIS*, *Wall. Cat. n. 5129* [300].

Distrib. Perak and Selangor, India and Andamans.

90. *DRACÆNA ELLIPTICA*, *Thunb. Diss. Bot. Drac. 6* [300].

Distrib. Common in the Malay Peninsula; Silhet, Burmah, Andamans, and Malay Islands.

COMMELINACEÆ.

91. *FORRESTIA GLABRATA*, *Hook. in Flora, xlvii. (1864)* 360 [300].

Distrib. India, Tonkin, Java, and Sumatra.

A new addition to our flora.

PALMÆ.

92. *PINANGA POLYMORPHA*, *Becc. Malesia, iii. 173* [300].

Distrib. Perak, Selangor.

93. *PINANGA SCORTECHINII*, *Becc. Malesia, i. 170* [300].

The petals of the male flowers are in this form lanceolate and acute, not ovate.

Distrib. Penang, Perak, Selangor.

94. *IGUANURA GEONOMÆFORMIS*, var. *MALACCENSIS*, *Ridl. Mat. Fl. Mal. ii. 150* [300].

The form with the leaves cut into many lobes.

Distrib. Malay Peninsula.

95. *CALAMUS VIRIDISPINUS*, *Becc. in Hook. f. Fl. Brit. Ind. vi. 458* [300].

Distrib. Perak.

ARACEÆ.

96. *ARISÆMA ANOMALUM*, *Hemsl. in Journ. Bot. xxv. (1887) 205* [300].

Distrib. Perak.

97. *AMORPHOPHALLUS BUFO*, *Ridl. in Journ. Fed. Mal. States Mus. iv. (1909) p. 89* [301].

Distrib. Perak at Telom.

98. *AGLAONEMA SCHOTTIANUM*, *Miq. Fl. Ind. Bat. iii. 316* [301].

Distrib. Burmah, Malay Peninsula, Borneo.

99. PIPTOSPATHA ELONGATA, *Ridl. Mat. Fl. Mal. Pen.* iii. 35 [301].

Distrib. Hills of the Malay Peninsula and Borneo.

100. ANADENDRUM MONTANUM, *Schott, in Bonplandia*, v. (1857) 45; *Prod.* 391 [301].

Distrib. Whole Peninsula, Tenasserim, Borneo.

CYPERACEÆ.

101. SCLERIA RADULA, *Hance, in Ann. Sc. Nat.* ser. 4, xviii. (1862) 232 [301].

Distrib. Perak, Hongkong.

102. GAHNIA JAVANICA, *Mor. Verz. Zoll. Pfl.* 98. [301].

Distrib. High altitudes, Malay Peninsula.

GRAMINEÆ.

103. PANICUM PATENS, *Linn. Sp. Pl.* 86 [301].

Distrib. Indo-Malaya, Polynesia.

104. PANICUM PILIPES, *Nees & Arn.; Miq. Pl. Jungh.* iii. 376 [301].

Distrib. Common in the East from the Mascarene Isles to Polynesia.

105. PANICUM SARMENTOSUM, *Roxb. Fl. Ind.* i. 308 [301].

Distrib. Indo-Malaya, China.

106. PANICUM UNCINATUM, *Raddi, Agrost. Bras.* 41 [301].

Only previously met with at Temengoh.

Distrib. India, Ceylon, Malay Islands, and South America.

107. THYSANOLÆNA ARGOSTIS, *Nees, in Edinb. Phil. Journ.* xviii. (1835) 180 [301].

Distrib. Penang, Perak, Selangor.

108. LOPHATHERUM GRACILE, *Brongn. in Duperr. Voy., Bot.* 50, t. 8 [301].

Distrib. Tropical and Warm Asia.

FILICES.

109. ALSOPHILA COMMUTATA, *Mett. in Ann. Mus.-Lugd.-Bat.* i. 53 [301].

Distrib. Hills of the Malay Peninsula.

110. ALSOPHILA LATEBROSA, *Hook. Sp. Fil.* i. 37 [302].

Distrib. Common all over the Malay Peninsula.

III. HYMENOPHYLLUM JAVANICUM, *Spreng. Syst. iv.* 132 [302].

Distrib. Mascarene Isles, India, Malaya, Australia.

II2. TRICHOMANES PALLIDUM, *Blume, Enum. Pl. Jav.* 225 [302].

Distrib. Common on all the hills of the Peninsula; Java.

II3. TRICHOMANES RIGIDUM, *Sw. Prodr.* 137 [302].

Distrib. Most of the Tropics.

II4. TRICHOMANES PLUMA, *Hook. Ic. Pl. t.* 997 [302].

Distrib. Common on the hills at 4,000 feet alt.; Malaya Islands.

II5. TRICHOMANES MAXIMUM, *Blume, Enum. Pl. Jav.* 228 [302].

Distrib. Malay Peninsula and Islands and Polynesia.

II6. TRICHOMANES AURICULATUM, *Blume, Enum. Pl. Jav.* 225 [302].

Distrib. Selangor and Perak, Malay Isles, Japan, and Guiana.

II7. LEUCOSTEGIA NODOSA, *Bedd. Ferns Brit. Ind. Suppl.* 4 [302].

Only hitherto recorded from Gunong Buba in Perak.

Distrib. India and Java.

II8. DAVALLIA DIVARICATA, *Blume, Enum. Pl. Jav.* 237 [302].

Distrib. Rare. Perak, also Java.

II9. LINDSAYA FLABELLULATA, *Dryand. in Trans. Linn. Soc. iii. (1797) 41 t. 8. f. 2* [302].

Distrib. Tropical Asia and Australia.

120. LITOBROCHIA INCISA, *Presl. Tent.* 149 [302].

Distrib. Tropics generally.

121. BLECHNUM ORIENTALE, *Linn. Sp. Pl. ed. 1,* 1077 [302].

Distrib. Eastern Tropics.

122. ASPLENIUM HIRTUM, *Kaulf. Enum. Fil.* 169 [302].

A large form with long acuminate pinnæ.

Distrib. Malaya, Madagascar, Mascarene Islands, Seychelles, Polynesia.

123. A. NITIDUM, *Sw. Syn. Fil.* 280 [302].

Distrib. S. Africa to Indo-Malaya.

124. *A. TENERUM*, *Forst. f. Prod.* 80 [302].
Distrib. Ceylon, Malaya, and Polynesia.
125. *ASPLENIUM AMBOINENSE*, *Willd. Sp. Pl.* v. 303 [303].
Distrib. Mergui, Tavoy, Polynesia.
126. *DIPLAZIUM BANTAMENSE*, *Blume, Enum. Pl. Jav.* 191 [303].
Distrib. Indo-Malaya, China.
127. *DIPLAZIUM TOMENTOSUM*, *Blume, Enum. Pl. Jav.* 192 [303].
Distrib. Common. Burmah, Malaya.
128. *DIDYMOCHLÆNA LUNULATA*, *Desv. in Mém. Soc. Linn. Paris*, ii. (1827) 282 (303).
Distrib. Malay Peninsula, Burmah, Mascarene Islands, Polynesia, America.
129. *MESOCHLÆNA POLYCARPA*, *Bedd. Ferns Brit. Ind. Suppl.* 13 [303].
Distrib. Malay Peninsula and Islands.
130. *ASPIDIUM PACHYPHYLLUM*, *Kunze, in Bot. Zeit.* 1848. 259 [303].
Distrib. Malay Peninsula and Islands.
131. *LASTRÆA IMMERSA*, *T. Moore, Index Fil.* p. lxxxix [303].
Distrib. Malay Peninsula and Islands.
132. *LASTRÆA CALCARATA*, *T. Moore, Index Fil.* 87 [303].
Distrib. India and Malaya.
133. *LASTRÆA SPARSA*, *T. Moore, Index Fil.* 104 [303].
A new record for the Malay Peninsula.
Distrib. India, Ceylon, Malay Isles, China, Mauritius.
134. *NEPHRODIUM HETEROCARPUM*, *T. Moore, Index Fil.* 93 [303].
Distrib. Malaya.
135. *NEPHROLEPIS DAVALLIOIDES*, *Kunze, in Bot. Zeit.* 1846, 460 [303].
Distrib. Malay Peninsula, Java.
136. *OLEANDRA NERIIFORMIS* *Cav., in Anal. Hist. Nat. Madrid*, i. (1799) 115 [303].
Distrib. Common on our hills above 3,000 feet.

137. POLYPODIUM HIRTELLUM, *Blume, Enum. Pl. Jav.*
123 [303].

Distrib. Hills at 4,000 feet, also Ceylon.

138. GYMNOGRAMMA CALOMELANOS, *Kaulf. Enum. Fil.* 76
[303].

Distrib. Tropics, Natal.

139. ELAPHOGLOSSUM LAURIFOLIUM, *T. Moore, Index Fil.*
p. xvi [303].

Distrib. Tropical Asia, Mascarene Islands.

140. ANGIOPTERIS EVECTA *Hoffm. Comm. Soc. Reg. Gott.*
xii. 29, t. 5 [303].

Distrib. Madagascar, Indo-Malaya, Japan, Polynesia.

LYCOPODIACEÆ.

- 141 SELAGINELLA WALLICHII, *Spring, Mon.* ii. 143 [304].

Common in the hill districts.

Distrib. Indo-Malaya.

MUSCI.

142. POGONATUM MACROPHYLLUM, *Dozy & Molkenb. Bry.*
Jav. i. 45, t. 35 [304].

Distrib. Malay Archipelago.

143. RHIZOGONIUM SPINIFORME, *Bruch, in Flora*, xxix.
(1846) 134 [304].

Distrib. Throughout the tropics.

Both these mosses are common in the Malay Peninsula.

II. AEROMYS, A NEW GENUS OF FLYING-SQUIRREL.

By HERBERT C. ROBINSON, C.M.Z.S. and
C. BODEN KLOSS, F.Z.S.

We have recently been fortunate enough to obtain several fresh examples of the rare Flying-squirrel described by Günther (P.Z.S. 1873 p. 413, pl. xxxvii) as *Pteromys tephromelas*. On examination these prove to possess so many distinct characters as to require the erection of a new genus for the reception of this and the allied species *Pteromys phaeomelas*, Günther, from Borneo, which we have also inspected. We have characterized this below and propose that it should be known as

AEROMYS, genus nov.

Large to medium sized flying-squirrels, having the external appearance of *Petaurista* and the dentition of the *Sciuropterus* group.

Tail cylindrical, non-distichous, the base contained in the interfemoral membrane. Antebrachial membrane present. Soles naked except the heel. Digits hairy beneath.

Skull generally resembling *Petaurista* but less robust and narrower. Bullae not constricted mesially and more triangular in outline. No palatal spine. Zygomatic plate, as in the *Sciuropterus* group, lacking a pronounced post-orbital point.

Teeth markedly different from those of *Petaurista*, more nearly agreeing with *Hylopetes*. Crowns not flat, with two transverse ridges meeting on an elevated cusp on the inner margin of the upper teeth: no deep transverse notch at the postero-internal angle. Sides of ridges sculptured and wrinkled, p^3 well developed, interior to the anterior extremity of p^4 . p^4 about equal in area to m^1 .

Type—*Aeromys tephromelas* (*Pteromys tephromelas*, Günther) from the Malay Peninsula.

Other species: *Aeromys phaeomelas* (Günther), from Borneo.

III. MALAY FILIGREE WORK.

By I. H. EVANS, B.A. *Assistant Curator and Ethnographical Assistant F.M.S. Museums.*

By the courtesy of Mr. R. O. Winstedt, District Officer, Kuala Pilah, the writer was recently enabled to visit a Malay goldsmith at the village of Berlombong, about three miles from Kuala Pilah. The art of making gold filigree was, until recently, supposed to be dead in the Federated States, but Mr. Winstedt has lately discovered several smiths in Negri Sembilan who are capable of turning out this class of work, *Tukang Adam*, the man visited at Berlombong, being one of them.

There is an excellent account of the manufacture of Malayan gold filigree work in Marsden's "History of Sumatra" (pp. 178-180), and this is reproduced in Mr. Winstedt's pamphlet on Malay Industries in the series of papers on Malay subjects published by the F.M.S. Government.

The present short article has little claim to add anything new to the subject, except perhaps, the *pendinding* prayer used by the smith, but it may be useful as confirming Marsden's observations, which were made more than a hundred and thirty years ago, and showing that the same methods still prevail.

Before starting work upon the raw gold the smith repeats the following spell or prayer in order to shield himself from all harm.

Allah tuhanku, rasul Allah.

Di-hadapan aku Raja Jibrail,

Di-kiri di-kanan 'ku segala sidang malaikat.

Meninding aku Salam laut sipat-u'llah.

Ya, Musa kalam u'llah,

Ya, hanan,-ya dayan ;

Ya-sin dalam koran tiga-puluh.

Tutup terkunchi hati mulut

Barang barang satu bahaya 'kan lawan-ku ;

Těrbuka, tėrkěmbang segala pintu rěžěki-ku.

Tajam měngadap aku lagi tumpul ;

Bisa měngadap aku lagi tawar ;

Gunching (Kanching ?) pada hadap aku lagi *momah* (mamah ?).

Aku dalam kandang kalimah.

La-ilaha-ila-lla, Muhamad rasul Allah.

* Oh Allah, my God ; oh, prophet of God ;
In front of me is prince Gabriel ;
Right and left of me the whole company of angels.
My fences the Lord of the sea, the chosen (protecting)
line of God.

Oh Moses, God's scribe.

Oh Merciful, Gracious.

God's word in the thirty chapters of the Koran.

Shut and locked be the hearts and the mouths

Of those who'd imperil me ;

Open spread wide be the gate of mercies to me.

Let the sharp become blunt at my presence,

The venomous become robbed of its venom ;

Iron bolts (?) as chewed food (?).

I stand in the fold of the faith.

There is no God but Allah and Mahomed's his Prophet.

The tools used by the smith are few and primitive, merely consisting of an iron plate bored with holes of different sizes, used for drawing down gold wire to the required size, three pairs of native or Chinese made pincers, a pair of forceps, a small anvil set in a block of wood and two or three hammers of different sizes. The gold is melted in a crucible on a rectangular open hearth of earth, and the charcoal fire blown up by a horizontal box bellows †. A pipe from the middle of the latter leads to the hearth centre, passing under an arch of hardened clay. In addition to the open hearth the smith uses a paraffin flare and a blowpipe for softening small pieces of gold, the flare being simply an old beer bottle, supported at an angle of about thirty-five degrees, with a rag stuffed into its mouth to act as a wick.

The first thing to be done in making a filigree ornament is to get ready the gold backing ‡ (*tapak*) to which the fine wire patterns are to be affixed. When a sheet of gold has been cut to the size and shape required for this, the smith proceeds to draw down the wire used in making the filigree. This is a long and tedious process. A piece of gold is first

* I have to thank Mr. R. O Winstedt for helping me to make a correct translation of this prayer.

† Bamboo tubes, called *tropong*, are used in addition for blowing up the fire.

‡ Marsden calls this *papan*.

roughly hammered out into a wire of considerable thickness and an end is passed through one of the largest holes in the iron plate mentioned above; the wire is then pulled through with the aid of a pair of pincers. All the holes on one side of the plate have their mouths enlarged into cup-shaped depressions of various sizes. A little cocoanut oil is put into the depression with a feather before the wire is drawn through the hole, and as the wire is threaded in from the side on which the depressions are, any gold which may be stripped off in the process of drawing is left behind in the cup and adheres by reason of the oil. The drawing process is repeated again and again, a smaller hole being used each time. Occasionally the wire becomes too hard to stand further fining down without breaking, and the smith then lights his paraffin flare, rolls the wire into a coil, places it on a block of charcoal and softens it by means of the flame and small brass blowpipe (*penyup*). Each time the wire is put through a smaller sized hole the end of it has to be cut or scraped with a sharp knife, until its circumference is sufficiently small for enough of it to pass through to afford a hold for the pincers. The drawing down process is continued, —the refuse gold being occasionally scraped out from the cups and deposited in a small cocoanut shell, plate or dish,—until the wire is rather finer than an ordinary piece of sewing cotton, when it is considered ready for the next process. This consists in giving the prepared wire a twist, as Marsden observes, "like that in the handle of a whalebone punch ladle," and this is obtained by rolling the wire on a block of wood under a flat stick. When the twisting is finished, the wire is lightly tapped with a hammer until it is slightly flattened. The smith is then ready to begin composing the filigree (*—karangan*; i.e. composition). A long piece of plain flattened wire is first taken and a sufficient length cut from it to form a boundary round the edge of the *tapak*. This is bent into shape and fastened on edge in the required position with a kind of glue (*getah kenderi*), which is made from a small red seed with a black spot on it, said to be the fruit of a climbing plant (*akar*) called *Kenderi* *. Borax powder (*pejar*), used as a flux, and filings from a block of alloy of gold, silver and brass, are spread evenly along the wire, which is fixed down to the backing with tiny little clamps, made from small strips of iron, bent double. Heat is next applied by means of the flare and blowpipe, and the alloy, acting as a solder, fuses with the wire and the metal of the backing. The clamps are then taken off, an inner edging of twisted wire arranged as before, and the clamps put back. When this has also been soldered into position in the same manner, the clamps are finally removed, and the smith begins the work

* The composition of this alloy is 4 parts gold, to 1 part silver and 1 part brass. A small square block of the alloy is fixed into the side of a stick of wood, which acts as a holder for it when it is being filed.

Probably *Abrus precatorius*

of setting in the patterns of the *karangan*. For these he bends up the twisted and flattened wire with the forceps into the required shapes for the patterns, cutting off each little portion of pattern as it is made. When he has thus got enough pieces to do a large section of the work he moistens them with the "getah" to make them stick, and sets them in position on the gold backing with the forceps. This arrangement being finished, he covers all the *karangan* evenly with the mixture of borax and solder, and heats it with the blowpipe flame until the wires have become attached to the back plate. Large pieces of the *karangan* are thus done at one time, and when the whole of it is completed the only thing that remains to be done is to clean up the work. Small round balls, called fishes eggs (*telor ikan*) made by fusing a little gold dust on a piece of charcoal, or tiny circular gold discs, called pepper seeds, (*biji lada*), made by flattening the aforesaid balls, are frequently applied to the filigree as ornaments, being affixed in exactly the same way as the gold wire. Newly made ornaments are cleaned and then (purposely) dulled by letting them simmer in a solution of alum (*turas*), brushing them, covering them with alum paste and putting them on a charcoal ember for a few minutes, before brushing them again.

The dulling process is called *sepoi kuning* (yellow *sepoi*), as opposed to *sepoi merah* (red *sepoi*) a red colouring, much appreciated by Malays, which is frequently given to gold articles. This can be produced by two or more methods. One way, that used by *Tukang Adam*, is to make a solution of borax (*pijar*) and a green crystalline substance obtained from the Chinese shops, probably green vitriol which is called either *tunjong* or *gunjar*. The articles to be coloured are dipped several times alternately into the solution and into hot water, and then cooked for a short time on a charcoal ember. The result is that a dark purplish-red deposit forms all over the gold of the ornaments. In another method a mixture of saltpetre and sulphur is employed; but this was said to be troublesome to use.

The chief articles to which filigree work is applied are the mountings of kris, or dagger hilts, the tops of small boxes for holding chewing requisites, the ends (*buntut*) of kris sheaths, rings, brooches, buttons, small clasps used instead of buttons, gold beads for threading as necklaces, ear studs, and pendants (*dokoh*). Silver filigree work is sometimes to be obtained, that from Upper Perak and the so-called Patani States being particularly fine.

IV. ON TWO NEW BIRDS FROM THE SOUTHERN PORTION OF THE MALAY PENINSULA.

By HERBERT C. ROBINSON, *M.B.O.U.* and
C. BODEN KLOSS, *M.B.O.U.*

In 1911 (*Ibis*, p. 79) we recorded the dull coloured little Flower Pecker, *Piprisoma modestum* (Hume), from Trang in the north of the Malay Peninsula, noting this locality as the most southerly hitherto recorded and, somewhat incautiously perhaps, stating that it certainly does not occur in that portion of the Malay Peninsula under British influence.

In this, however, we were in error, as amongst a collection obtained by the Museum collectors in January, 1913, at Bukit Tangga in Negri Sembilan, on a pass on the main Peninsular divide at about 1,500 ft. altitude occur four specimens of what are certainly this species. They, however, present sufficient differences from two specimens from Trang to merit separation as—

PIPRISOMA MODESTUM subsp. REMOTUM, subsp. nov.

Differing from the typical race in having the whole of the upper surface, sides of the head and outer aspect of the wings duller and darker grey, with less tinge of olive green. White on outer tail feathers perhaps rather less extensive, but this character not very marked. Total length, 3.8; wing, 2.37; tail, 1.4; bill from gape, 0.43 inches.

Type—Adult male, Bukit Tangga, Negri Sembilan, 1,500', 27th January, 1914 (*nat. coll.*) F. M. S. Mus. No. 1/14. Two other males and a female from the same locality examined.

Remarks: Bukit Tangga is nearly 400 miles distant from the nearest locality from which *P. modestum* has been obtained, otherwise we should have hesitated to describe this form on distinctions which are somewhat fine, though quite obvious in the four specimens before us.

RHINOMYIAS TARDUS, sp. nov.

In September 1913 the Museum collectors obtained on Bukit Tampin, a hill in Negri Sembilan near the Malacca boundary rising to 2,500 ft., two examples of an unknown species of *Rhinomyias*, and in the same month of the present year they collected a third specimen at Genting Bidai, 2,300 ft., a pass in the main range between Selangor and Pahang.

This species, which may be known as *RHINOMYIAS TARDUS, sp. nov.* differs from *R. pectoralis*, the only other species inhabiting the Malay Peninsula, in being more olivaceous throughout, the tail and edges of the wing feathers alone

having a slight rufescent tinge. On the under-surface the breast-band, light olive-brown in colour, is much broader, extending over the chest to the abdomen and flanks, and the white throat patch is less clear, being slightly washed with the colour of the chest and sides of neck, while the lower abdomen is pale ivory yellow.

The bill, as compared with that of *R. pectoralis*, has the upper mandible slightly less keeled and the lower is pale, not blackish.

Length of wing, 80 mm; tail, 61; tarsus 16.7; bill from gape, 20.5.

Dr. E. Hartert, who has examined the two individuals from Tampin (an adult and a slightly immature female) has kindly sent us the following remarks: "The new form resembles much more the large-billed *Rh. colonus*, Hartert, from Sula Mangoli and *Rh. nicobaricia* from the Nicobars (than *R. pectoralis*). It differs, however, from *Rh. colonus* chiefly in the tail, which is brown and not chestnut rufous, and from *Rh. nicobarica* also in the less rufescent edges to the rectrices, somewhat more olivaceous back and rump and a little darker chest-band. It agrees with both the latter in the lower mandible being *light in the adult birds*." In these two individuals the abdomen lacks the yellow tinge of the male.

Type: Adult male, Genting Bidai, Selangor-Pahang Boundary, Malay Peninsula, 2,300 ft. 19th September 1914, F. M. S. Mus. No. 157/14.

V. ON THE SPECIES OF MINIVETS (PERICROCOTUS) OCCURRING IN THE MALAY PENINSULA.

By HERBERT C. ROBINSON, C.M.Z.S., M.B.O.U.

The species of the genus *Pericrocotus* or Flycatcher Shrikes are amongst the most brilliant and attractive of Oriental birds and much attention has, as a consequence, been paid to them both by systematists and collectors. Owing, however, to the fact that the characters relied on to separate the species are, in many cases, variable within the species, the distinctions between certain of the allied forms are by no means so clear as might be desired, and a good deal of confusion exists as to the actual range and occurrences of several of the Malayan species.

The F. M. S. Museums possess very large series of all the species from the Malay Peninsula, and in the present paper I have attempted to arrange these and the synonymy belonging them without in any way claiming any originality of treatment.

KEY TO THE SPECIES.

- A. Plumage with no red or yellow— *P. cinereus*, p. 32.
- B. Plumage mainly red or yellow—
 - a. The central tail feathers entirely black in the male: quill lining yellow ... *P. igneus*, p. 32.
 - b. The central tail feathers partly red in the male, quill lining red
- A1. With no isolated red or yellow marks on the outer webs of the tertiaries ... *P. montanus*, p. 33.
- B1. With isolated red or yellow marks on the outer webs of the tertiaries
 - a. Larger, wing as a rule exceeding 85 mm. ... *P. zanthogaster flammifer*, p. 35.
 - b. Smaller, wing less than 85 mm. ... *P. zanthogaster zanthogaster*, p. 37.

PERICROCOTUS CINEREUS. The Ashy Minivet.

Pericrocotus cinereus, Lafr.; *Hume, Stray Feath.* v, p. 175, 176 (1876); *Sharpe, Cat. Birds, Brit. Mus.* iv, p. 83 (1879); *Ogilvie, Grant, Fascic. Malay. Zool.* iii, p. 90 (1905); *Robinson, Hand-list Birds Malay Pen.*, p. 14 No. 394 (1910); *Robinson & Kloss, Ibis*, 1911, p. 55.

Adult male.—Whole under surface and under tail coverts and crown to behind the eye, white, inclining to ashy on the lower surface; lores, a stripe through the eye, hind, crown and nape glossy black; mantle, back, upper tail coverts, lesser and inner wing coverts and tertials clear grey; tail feathers blackish grey, all except the two median pairs with the terminal portions largely white, increasing in extent towards the outer pairs. Primaries and secondaries blackish brown, with a broad diagonal band of white on the inner webs except on the outer primary, increasing interiorly; bases of the secondaries broadly white. Primary coverts blackish, the innermost broadly edged with grey on the outer webs. Outer axillaries whitish, inner slate grey broadly tipped with white, inner wing coverts mingled white and slate grey.

Adult female.—The series before me, if the sexing is to be relied on, indicates that the adult female only differs from the other sex in having the white frontal band considerably narrower, not extending beyond the eyes.

Immature.—Immature birds of both sexes, which in the Malay Peninsula are in the large majority, differ from the adults in lacking the clear white frontal band; the lores, occiput and nape are ashy grey, not glossy black, and the primaries and central tail feathers are more brownish.

Dimensions.—Adult male: total length, 7.1; wing, 3.6; tail, 3.7 in.

Adult female: total length, 7.2; wing, 3.7; tail, 3.75 in.

Localities in the Peninsula.—Siamese Malay States: Trang (December, January, February). Pulau Langkawi (November, December). Penang (March). Perak: Temerloh (January). Selangor: Klang Gates (January); Kuala Lumpur (December, February, March); Kuala Langat, Batu (November, December); Pulau Pintu Gedong (October). Pahang: Krau River (November).

Note.—As the above dates show this species is not resident in the Malay Peninsula but only appears during the winter months, when it often occurs in considerable numbers, especially on the coast.

PERICROCOTUS IGNEUS. The Fiery Minivet.

Pericrocotus igneus, Blyth; *Sharpe, Cat. Birds Brit. Mus.* iv, p. 78 (1879); *Robinson, Hand-list Birds Malay Penins.* p. 14, No. 393 (1910).

Adult male:—Head all round, throat, mantle, greater part of the primaries and secondaries, wing-coverts, centre pair of tail feathers greater part of the second innermost pair and the bases of the other pairs in a lessening degree glossy black. External aspect of the wings with a broad diagonal bar of orange red, starting on the fourth primary and extending to the innermost tertials, the last tertial only entirely black; inner aspect of the wing with a similar lemon yellow bar formed by patches on the inner webs of the primaries and secondaries; rump and upper tail coverts, under surface except the throat and those parts of the tail feathers that are not black, vermilion orange, more crimson on the rump, the bases of the feathers chrome. Axillaries and under wing coverts, chrome, tipped with orange red, their bases black, thighs black. Angle of the wing orange chrome.

Adult female:—Those portions of the plumage that are glossy black in the male, grey with a faint yellowish cast, blacker on the wing and tail feathers; a frontal band and eye ring orange chrome, this colour extending as a short superciliary beyond the eye. Under surface chrome yellow, under wing coverts and wing band similar, lower back and upper tail coverts vermilion, light portion of the tail orange yellow, suffused with vermilion, thighs mingled greyish and yellow.

Immature:—Resemble the female but are brownish above, each feather edged with yellowish white, frontal band and eye ring absent; beneath pale fuscous faintly barred with brownish white, the middle of the abdomen pale yellow.

Dimensions:—Adult male: total length, 5.75; wing, 2.9; tail 2.8 in.

Adult female: total length 5.5; wing 2.75; tail 2.8 in.

Localities in the Peninsula:—Siamese Malay States: Bandon, Ban Kok Klap (July). Perak: Temongoh (July); Parit (September). Selangor: Ulu Gombak (September); Klang Gates (January); Ginting Bidai, 2,300' (May); Cheras (March). Negri Sembilan: Gunong Tampin (September). North Johore: Segamat, Padang Tuan (September). East Johore: Tanjong Leman (June).

Notes:—This species is resident and breeds in the country apparently from May to June. It is fairly common along the east coast among Casuarinas and in forest country up to about 2,500' but is everywhere much scarcer than either *P. montanus* or *P. zanthogaster*, nor is it found in such large flocks.

PERICROCOTUS MONTANUS. Wray's Minivet.

Pericrocotus montanus, *Ann. Mus. Civ. Gen.* xiv, p. 205 (1879) (*Mt. Singalan, W. Sumatra*); *Sharpe, Ibis*, 1889, p. 193 (*Kinabalu, N. Borneo, 8,000'*); *id Ibis*, 1892, p. 435 (*Mt. Dulit, Borneo, 5,000'*); *Salvad. Ann. Mus. Civ. Gen.* (2) xii, p. 54 (1891) (*Toba Lake, Central Sumatra*); *Hartert Nov. Zool.* ix, p. 554

(1902) (*Gunong Tahan, Pahang*); Ogilvie Grant, *Fascic. Malay Zool.* iii, p. 91 (1905) (*Perak, Pahang Boundary, 4,000'*); *id.* *Journ. Fed. Malay States Mus.* iii, p. 34 (1908); *Robinson tom. cit.* ii, p. 192 (1908); *id.* *Hand-list Birds Malay Penins.* p. 14, no. 391 (1910).

Pericrocotus cinereigula, Sharpe, *Ibis*, 1889, p. 192; *Whitehead, Exploration, Kinabalu*, plate to p. 40 (1893).

Pericrocotus wrayi, Sharpe, *P. Z. S.* 1888, p. 269, pl. xv (*Batang Padang Mountains*).

Pericrocotus croceus, Sharpe, *P. Z. S.* 1888, p. 269 (*Gunong Batu Puteh, S. Perak*); *Bonhote, P. Z. S.* (i) 1901, p. 60 (*Gunong Inas, N. Perak*); Ogilvie Grant *Fascic. Malay Zool.* iii, p. 91 (1905) (*Perak-Pahang boundary, 4,000'*).

Adult male.—Head, nape, mantle, inner and lesser wing coverts shining black; ear coverts, sides of the face and throat dark grey. Primaries and secondaries the bases of all the tail feathers and the greater part of the two median pairs, black; greater inner wing coverts with their terminal portions scarlet; Primaries and secondaries from the fifth primary inwards with their outer webs edged with scarlet, increasing progressively inwards, the basal half of both webs scarlet orange. Rump and upper tail coverts scarlet, under surface except the throat and portion of the tail that is not black, scarlet orange, thighs mingled black and orange buff or apricot; wing lining edge of the wing and axillaries orange. Bill and feet black, iris dark hazel.

Adult female.—Distribution of colour similar to that of the male, the red throughout being replaced by yellow intermediate between "Cadmium Yellow" and "Light Cadmium" of Ridgeway. The black of the upper surface more greyish blue and less shining than that of the male and the ear coverts of a paler grey. Chin and upper throat greyish white. Thighs mingled white and brownish black. This is the stage described as *P. croceus* by Ogilvie Grant (*Fascic. Malay. loc. cit. p. 91.*)

Immature.—The immature of both sexes are similar to the adult female, except that the head and mantle are of a paler grey, with much less gloss and the yellow of the rump and upper tail coverts has a strong cast of olive, while the bases of the feathers are broadly grey, giving an impression of ill-defined cross barring. This is the stage figured by Sharpe (*loc. cit.*) as the adult female of *P. wrayi*. The adult male plumage appears to be attained from this stage in part by a moult of the yellow feathers and in part at least by a direct colour change, though by the majority of authorities on moulting this is roundly asserted to be impossible.

Juvenile.—Younger birds still resemble the immature female but have a greenish tinge over the grey of the upper parts, the ear coverts even paler grey and the feathers of the head and mantle narrowly edged with dirty white.

Dimensions.—Adult male—Total length, 6.7; wing, 3.15; tail 3.9 in.

Adult female—Total length, 6.7; wing, 3.1; tail, 3.8 in.

Localities in the Peninsula. Perak: Larut Hills, 3—4,000' (October); Gunong Kerbau, 5,000' (March); Telom, Perak Pahang Boundary 3—4,000' (September, November, December). Pahang: Gunong Tahan, 5,000' (July). Selangor: Bukit Fraser, 4,000' (October); Semangko Pass, Selangor, Pahang border (February, March, November) Gunong Mengkuang Lebah, 5,000' (January, March); Gunong Menuang Gasing, Ulu Langat, 4,000' (May). Elsewhere common in the high mountains of Borneo and Sumatra.

Notes.—As the synonymy shows this species which is fairly wide, ranging over elevated land in the Malayan region, has received numerous names, partly owing to the fact that the colour of the throat in the male is very variable, ranging from a light grey to an almost glossy black, while the immature birds of both sexes differ from the adult female.

The large series before me, which includes topotypes of Salvadori's *P. montanus*, comprises specimens which can be referred to all the nominal species from one and the same locality and all, therefore, have to be included under Salvadori's as the earliest name, as has already been pointed out by Hartert. Judging from the dates of immature skins in the Museum the species probably begins to breed in the Peninsula about December or January. —

***Pericrocotus xanthogaster*, subsp. *flammifer*.**

Davison's Minivet.

Pericrocotus flammifer, Hume, *Stray Feath.* iii, p. 321 (1875); *id op. cit.* v, pp. 175, 195 (1877); Hume & Davison, *op. cit.* vi, p. 211; Sharpe, *Cat. Birds Brit. Mus.* iv, p. 74 (1879); Oates, *Faun. Brit. Ind. Birds*, i, p. 477 (1889); Ogilvie Grant, *Fascic. Malay. Zool.* iii, p. 91 (1905); Robinson, *Journ. Fed. Malay States Mus.* ii, p. 192 (1908) Robinson & Kloss, *Ibis*, 1911, p. 54.

Pericrocotus speciosus fraterculus (nec. Swinhoe), Butler, *Journ. Straits Branch Royal. Asiat. Soc.* No. 32, p. 17 (1899); Hartert, *Nov. Zool.* ix, p. 555 (1902).

Adult male.—Head all round, nape, mantle, throat, outer and lesser wing coverts glossy black. Inner webs of central pair of tail feathers and bases of the remainder, black, the black lessening towards the outer pairs. Primaries, secondaries and tertials black, with an oblique bar of crimson scarlet on the primaries, beginning on the outer web of the fourth primary; secondaries and all but the innermost tertials with their basal halves scarlet; the inner tertials with isolated drops of scarlet on their outer webs; inner primary coverts

with their terminal two-thirds scarlet; axillaries and under wing coverts orange, the bases of the former black; thighs black; rest of the plumage brilliant scarlet orange, more scarlet on the rump and upper tail coverts, the bases of the feathers of the abdomen orange chrome. Bill and feet black, iris dark hazel.

Adult female.—Head behind the level of the eyes, nape, mantle and scapulars grey, slightly suffused with greenish. Forehead to the eyes, a patch round the eyes and a short superciliary stripe, extending slightly beyond the eyes bright chrome yellow. Stripe from the nostrils to the eyes, blackish. Lower back, rump and upper tail coverts, greenish yellow. Whole under surface bright chrome yellow, the lower of the feathers of the abdomen white; the thighs mingled brownish and yellow. Wings black, the first four primaries uniform on the outer web, the remainder with a diagonal chrome yellow bar. Secondaries and tertiaries with their basal third chrome yellow and with elongated isolated drops of the same colour on the outer webs. Lesser wing coverts greyish, except on the angle of the wing; greater ones black, their tips chrome yellow. Under wing coverts pale yellow and fuscous, the axillaries yellow with their bases, blackish. Innermost pair of tail feathers entirely black, the next pair mainly black, the third pair about half black, the black regularly diminishing to the outermost pair in which only the basal third or fourth is black; remainder of the feathers pure chrome yellow.

Dimensions.—Adult male. Total length, 6.75; wing, 3.38; tail, 3.25 in.

Adult female. Total length, 6.75; wing 3.4; tail, 3.25 in.

Immature.—The not fully adult birds of both sexes resemble the adult female, from which garb the male changes into the adult dress in part by a deepening of the pure yellow feathers to orange and thence to vermilion scarlet, this change being very well shown in the large series in the Selangor Museum. Still younger birds have the yellow colour beneath duller, the feathers of the head and mantle with white margins, and the primaries edged with white.

Localities in the Peninsula.—Siamese Malay States: Bandon (June); Trang (November, December, January). Perlis: Pelarit (November). Perak: Temongoh (July); Taiping (July). Selangor: Semangko Pass, 2,700' (February); Bukit Kutu (August); Klang Gates (January); Ginting Bidai, 2,300' (September); Ulu Gombak (September). Pahang: Bentong (June).

Notes.—This race is widely spread throughout the Peninsula in submontane country, ranging up to about 3,000' in altitude, above which its place is taken by *P. montanus*. As is the case with many other species originally described from Southern Tenasserim by Hume it is evident that it has no

claim whatever to specific rank, but is only a slightly larger form of the Sumatran and Bornean *P. xanthogaster*. Raffles with the female slightly more brightly coloured. None of the Peninsula examples are as large as those of Hume's series from Tenasserim, though northern specimens are decidedly larger than those from Johore and from authentic specimens of *P. xanthogaster* from Sumatra and Borneo with which I have compared them. The presence or absence of red on the outer web of the fourth primary of the male, seems to be of little diagnostic importance though it is more frequently absent in southern than in northern peninsular specimens. It is present in three out of four Sumatran specimens and in both the Bornean skins which I have examined.

***Pericrocotus xanthogaster* subsp. *xanthogaster*.**

Raffles' Minivet.

Lanius xanthogaster, Raffles, *Trans. Linn. Soc.* iii, p. 309 (1822). *Pericrocotus xanthogaster*, Sharpe, *Stray Feath.* iv, p. 208 (1876); Tweed, *Ibis*, 1877 p. 315; Sharpe, *Cat. Birds Brit. Mus.* iv, p. 74 (1879); Nicholson, *Ibis*, 1883, p. 46; Buttkofer, *Notes Lev. Mus.* ix, p. 46 (1887). *Pericrocotus ardens*, Bp. *Consp.* i, p. 357 (1851); Hume, *Stray Feath.* v, p. 196 (1877).

Pericrocotus subardens, Hume, *Stray Feath.* v, p. 196.

Adult male.—Practically indistinguishable from that of *P. xanthogaster flammifer* but slightly smaller in size.

Adult female.—Yellow on the forehead, more restricted, and tint of the lower back and rump and under surface more suffused with greenish olive.

Dimensions.—Adult male.—Total length, 6.4; wing, 3.15; tail, 3.1 in.

Adult female.—Total length, 6.7; wing, 3.08; tail, 3.1.

Localities in the Peninsula.—Negri Sembilan: Bukit Tangga (January, July). Pahang: Krau River (November). North Johore: Segamat, Padang Tuan (February). Malacca (Brit. Mus.). South Johore (*Hume Coll.*). Singapore (*Brit. Mus.*).

Remarks.—Owing to the comparatively small series available, especially of females, the identification of the bird from the southern third of the Malay Peninsula with that from Sumatra and Borneo is not altogether certain, though it is probably correct. South of the termination of the main range in Southern Selangor the bird is decidedly rare and but few specimens are on record. In Sumatra and Borneo it appears to be fairly common.

VI. TWO NEW PLANTS FROM GUNONG TAMPIN, NEGRI SEMBILAN.

By H. N. RIDLEY, C.M.G., F.R.S., late Director of Gardens, S.S.

DIPLOSPORA LASIANTHA, *sp. nov.*

A shrub, branches slender, brown-velvety; leaves lanceolate to elliptic lanceolate, slightly oblique, shortly cuspidate, shortly narrowed at the base, 14 cm. long, 3.5 cm. wide; above, subglabrous, not polished except the midrib and margins, which are hairy; beneath dotted over with hairs, nerves 8 pairs, slender, ascending, midrib hairy; petiole, 5 mm. hairy. Stipules lanceolate acuminate, velvety hairy. Flowers, 3-4 sessile, axillary. Calyx velvety with short obtuse lobes. Corolla 4 mm. long, tube short, lobes four ovate, acute, all hairy except the glabrous inner face of the lobes. Stamens exsert in a cone from the mouth of the tube, hairy.

A very distinct plant in its small leaves and hairy corolla.

ARGOSTEMMA TENUE, *sp. nov.*

A succulent herb with a basal tuber, stem 6-10 cm. long, slender; leaves subterminal 3, one lanceolate long acuminate, base cuneate, thin, glabrous, pale beneath, 14 cm. long, 2.5 cm. wide, very shortly petioled, nerves very fine, ten; two below it, small unequal lanceolate obtuse, 8-10 mm. by .2 to 4 mm. Panicle lax, base, 2.5 cm. wide, bracts short foliaceous 4 mm. long. Branches slender. Calyx short campanulate, with rather large 4-lobed limb. Corolla lobes 4, lanceolate acuminate 4 mm. long, very narrow.

Stamens very narrow, forming a narrow elongate cone as long as the corolla, long beaked.

Near *A. verticillatum*, but the leaves are reduced to one long and two very small ones, and the inflorescence and flowers are very much smaller.

VII. ON TWO SNAKES NEW TO THE FAUNA OF THE MALAY PENINSULA.

By

C. BODEN KLOSS, F.Z.S.

Since the publication of Mr. G. A. Boulenger's volume on Reptilia and Batrachia in the "Vertebrate Fauna of the Malay Peninsula" (1912) a specimen of *Tropidonotus conspicillatus*, Günther, hitherto only known from Borneo (where it is fairly common), the Natuna Islands, and Singkep Island near the east coast of Sumatra and about 100 miles south of Singapore, has been obtained at Genting Sempah, Selangor-Pahang Boundary, 2,000 ft.

This snake may be indicated as follows in the "Synopsis of the Species" of the Malay Peninsula given in the above mentioned work (p. 123).

- I. Posterior maxillary teeth not abruptly enlarged. Internasals broadly truncate in front, nostrils lateral in a single nasal, 3 labials entering the eye, a single anterior temporal. *T. conspicillatus*.

The following is a description of the specimen obtained—Eye moderate; nostril in a semi-divided nasal; rostral twice as broad as deep, scarcely visible from above; internasals as long as broad or a little longer, broadly truncate in front, shorter than the prae-frontals; frontal once and a half as long as broad, longer than its distance from the end of the snout, shorter than the parietals; loreal deeper than long; one prae- and three post-oculars; temporals 2+1; eight upper labials, third, fourth and fifth entering the eye; four lower labials in contact with the anterior chin shields which are shorter than the posterior.

Scales in 19 rows, all keeled except the outer row. Ventrals 144; anal divided; sub-candals 50.

Above brown, paler anteriorly with a blackish network containing reddish-brown areas of yellow-edged scales which become posteriorly two rows of small yellow spots.

Head olive-brown; nape blackish; a streak along the upper lip, others behind the eye and on the occiput and a patch on the side of the neck pale pink.

Below pinkish-red, the throat and sub-candal scales spotted blackish.

Snout to vent 282 mm, tail 68 mm.

An example of *Tropidonotus saravakensis*, Günther, hitherto regarded as confined to Borneo, was collected on Mount Menuang Gasing, Selangor-Pahang Boundary at a height of 3-4000 ft.

Its place in the Synopsis of the Species, already referred to, comes under

- II. 2 or 3 last maxillary teeth abruptly enlarged, 3 labials entering the eye
 Scales in 17 rows ... *T. saravakensis*.
 Scales in 19 rows ... All the other species
 of section II known
 from the Peninsula.

The description of the specimen is as follows:—

Head distinct from neck; eye large; nostril in a semi-divided nasal; rostral broader than deep, scarcely visible from above; inter-nasals truncate in front, as long as broad, a little shorter than the prae-frontals; frontal once and a half as long as broad, longer than its distance from the end of the snout, shorter than the parietals; loreal deeper than long; one prae- and three post-oculars; temporals 2+3; eight upper labials, third, fourth, and fifth entering the eye; five lower labials in contact with the anterior chin shields which are shorter than the posterior.

Scales in 17 rows, all keeled. Ventrals 146; anal divided; sub-candals 45, tail imperfect. (The sub-candals are known to vary from 52 to 89).

Above olive-brown, paler anteriorly with a series of interrupted blackish cross-bars or a network of blackish patches, a series of light spots on either side the median line; upper surface of head vermiculated with black; labials yellowish with black sutures; yellow of the under-surface extending on to the sides of the neck and fore-body.

Below checkered black and yellow, the black predominating posteriorly.

Snout to vent 410 mm, tail (imperfect) 97 mm.

VIII. PLANTS FROM GUNONG KERBAU, PERAK.

By H. N. RIDLEY, C.M.G. F.R.S.

The collection of plants made on Gunong Kerbau in February and March by the Dyak collectors of the Federated Malay States Museum is of considerable interest. A certain number of specimens had been previously brought from the mountain by Mohammed Ariff, the plant collector of Penang Gardens, who visited Gunong Kerbau with Mr. B. BARNARD a few years ago. Of the species then obtained a number were re-collected by the present party, but the bulk of the collection forms an important addition to our knowledge of the flora of this mountain.

Two of the most interesting additions to our flora were *Eurya trichocarpa* Korth., and *Carex Walkeri* Arn., both plants occurring in India and the Malay islands and not previously known from the peninsula. There are 25 new species in the Collection, of which the most important are a *Vanilla* very unlike any of the few Oriental species of this genus and more resembling the South American species, and a handsome new *Gahnia*, belonging to a genus well represented in Australia but of which only 2 species were previously known from the Malay region.

Gunong Kerbau is a peak on a spur of the main peninsular range in the Kinta District of Perak, and is the second highest mountain in the Malay Peninsula, attaining a height of 7,160 feet, and being exceeded only by Gunong Tahan in Pahang.

The present collections were made in February and March, 1913, and cover the whole of the mountain to the extreme summit.

The Birds and Mammals obtained have already been listed in a previous number of this Journal (*Journ. Federated Malay States Mus.*, v, pp. 23-27, 1914).

[The present botanical collection, like the zoological one, contains several species that are also common on Gunong Tahan, though, as might be expected, several of the most characteristic plants of that mountain are not represented.
H. C. ROBINSON.]

ANONACEAE.

1. *Polyalthia pulchra*, King. At 4,200 feet.
2. *Melodorum manubriatum*, Hook. f. At 3,500 feet elevation.

MENISPERMACEAE.

3. *Cyclea laxiflora*, Miers. In fruit. At 4,000 feet.

POLYGALACEAE.

4. *Polygala venenosa*, Bl. At 4,500 feet.
5. *Polygala monticola*, Ridl. At 6,000 feet.
6. *Epirhizanthus aphylla*, Griff. At 3,500 feet.

VIOLACEAE.

7. *Viola serpens*, Wall. At 4,000 feet.

TERNSTROEMACEAE.

8. *Anneslea crassipes*, Hook. fil. At 4,500 feet.
9. *Gordonia imbricata*, King. At 4,500 to 5,500 feet.
10. *Eurya trichocarpa*, Korth. At 4,200 feet, a new record for the Peninsula, only known from India and Java.

ADINANDRA MONTANA, *sp. nov.*

Bud silky puberulous, otherwise glabrous except the flower. Leaves elliptic obtuse, narrowed at the base edge thickened, denticulate with small dark processes in the notches, coriaceous, dotted beneath with black glandular dots, nerves 11 pairs, elevated on both surfaces, midrib thick, grooved above, 7 cm. long, 4 cm. wide, petiole thick 2 mm, long. Flower solitary, axillary on a thick curved hairy peduncle 1.5 cm. long. Bract short, lanceolate, ovate, pubescent. 4 mm. long. Sepals outer pair ovate, obtuse, pubescent, inner ones glabrous, coriaceous, 5 cm. long. and as wide. Petals obovate, hairy, silky in the centre at the tip outside, otherwise glabrous.

At 6,600 feet. A single specimen. Allied to *A. macrantha* and *A. integerrima* but with the leaf very coriaceous and toothed. The flowers are not so large nor as hairy as those of *macrantha*.

12. *Ternstroemia Maclellandiana*, Ridl. At 4,000 feet.

STERCULIACEAE.

13. *Leptonychia glabra*, Turcz. At 4,200 feet.

TILIACEAE.

14. *Elæocarpus reticulatus*, Ridl. At 6,600 feet.

RUTACEAE.

15. *Evodia pachyphylla*, King. The small form; at 4,500 feet.

GERANIACEAE.

16. *Impatiens oncidoides*, Ridl. At 4,500 feet.

ILICINEÆ.

17. *Ilex epiphytica*, King. 4,500 to 6,600 feet.

18. *Ilex polyphylla* *sp. nov.*

Bark black, the upper parts of the stem pale. Leaves very close set, coriaceous, elliptic to nearly obovate, margins crenate serrate, midrib prominent, nerves invisible, above polished 1.5 cm. long, 9 mm. wide, petiole 1.5 cm. long. Flowers 2 to 4 on short thick axillary peduncles. Bracts ovate, very small. Pedicels 2 mm. long. Sepals 4 ovate, obtuse, pubescent. Petals 4 ovate-oblong, obtuse glabrous. Stamens 4 shorter. Anthers elliptic. Pistillode semiglobose obscurely 4-lobed.

At 6,600 feet. This belongs to the mountain section *Vaccinifoliae* but differs from all other species in the form of the foliage.

18. *Ilex grandiflora* *sp. nov.*

Branches stout, dark when dry. Leaves alternate, coriaceous, elliptic cuspidate, bases cuneate, nerves 7 pairs inarching 3 mm. from the border, prominent beneath, reticulations conspicuous 13-14 cm. long by 4.5 cm. wide, petiole stout, rugose 1-2.5 cm. Flowers in axillary pairs or in fours on a short peduncle, pedicels 5 mm. long. Bracts minute, ovate. Sepals 4 connate rounded, ovate. Petals 4 imbricate, free nearly to base, 2 outer, oblong, obtuse, inner ones broader, 3 mm. long. Stamens 4, alternate, filaments flattened, broad, tapering upwards, anthers subcordate terminal. Ovary large ovoid, stigma large cushion-shaped, lobed, sessile.

At 4,200 feet alt.

Only female flowers seen, apparently allied to *I. sclerophylla* Hook., but the flowers larger.

OLACINEÆ.

19. *Gomphandra lanceolata* var. *angustifolia*. At 4,000 feet.

20. *Lepionurus sylvestris*, Bl. At 4,000 feet.

Leaves very narrow and flowers longer stalked than usual.

SIMARUBEÆ.

21. *Eurycoma apiculata*, Benn. At 2,000 to 4,000 feet.

CELASTRINEÆ.

22. *Euonymus javanicus*, Bl. At 2,000 feet.

A form with much longer peduncles than usual and larger flowers.

LEGUMINOSÆ.

23. *Bauhinia Scortechinii*, King. At 4,500 to 5,500 feet alt.

SAXIFRAGACEÆ.

24. *Polyosma ilicifolia*, Bl. At 4,500 feet.
 25. *Polyosma coriacea*, King. At 4,500 to 5,000 feet.

MELASTOMACEÆ.

26. *Melastoma malabathricum*, var. *normale*, Don.
 The form commonly found at high altitudes.
 27. *Oxyspora stellulata*, King. At 4,500 to 6,000 feet.
 28. *Allomorphia exigua*, Bl. At 4,000 feet.

29. ALLOMORPHIA HIRTICALYX *sp. nov.*

A shrub. Stems rough brown, glabrous, internodes 2.5 cm. long. Leaves elliptic cuspidate, base rounded, glabrous, coriaceous 14 cm. long, 6.5 cm. wide, main nerves very prominent beneath, petiole 3 mm. long. Panicle terminal, lax, spreading 6-7 cm. long, base nude, scurfy for 3 mm. lowest branches 8 cm. long, cyme branches 4 cm. or less, all covered with glandular hairs. Bracts very small, linear, acuminate.

Calyx goblet-shaped, narrowed to the pedicel 5 cm. long, covered with glandular hairs, lobes short, blunt, ovate. Petals small, rounded 3 mm. long, obovate, retuse. Stamens all similar and very nearly equal, filaments slender, glabrous, anthers horn-shaped, lanceolate, 3 mm. long. Style slightly dilated upwards, filiform. Fruit ellipsoid, narrowed at the base, 5 mm. long, dehiscing from the top, eventually glabrous.

At 4,500 to 5,000 feet altitude. Also collected at the same locality by Mohammed Aniff.

30. *Sonerila trachyantha*, King & Stapf. At 4,500 feet.
 31. *Sonerila rudis*, King & Stapf. At 4,000-4,500 feet.
 32. *Sonerila tenuifolia*, Bl. At 4,000 feet.
 33. *Medinilla Clarkei*, King. At 4,500 feet.
 34. *Astronia smilacifolia*, Tri. At 2,000 feet.

MYRTACEÆ.

35. *Boeckia frutescens*, L. At 4,500 feet.
 36. *Leptospermum flavescens*, Sm. 6,000 to 6,600 feet.

37. *Rhodamnia trinervia* var. *uniflora*. At 5,500 feet elevation. The same form as on Mt. Ophir and Gunong Tahan?

38. *Rhodamnia trinervia* var. *sub-triflora*. At 4,500 feet.

39. *Eugenia Stapfiana*, King. At 4,500 feet.

40. E. (JAMBOSA) *JUGALIS* sp. nov.

Branches grey. Leaves very coriaceous, elliptic, blunt or rounded, narrowed at the base or obovate, drying pale, dotted black underneath, nerves about 8 pairs faint on both surfaces, especially beneath, secondaries nearly as conspicuous, midrib grooved above, elevate beneath, reticulations fine and prominent, 5 cm. long, 3 cm. wide, petiole thick channelled .5 mm. Corymb shorter than the leaves terminal 5 cm. long, pedicels 1 cm. long. Calyx obconic 7 mm. long. Petals suborbicular 5 mm. long, soon caducous separately. Stamens very numerous 1.5 to 2 cm. long, anthers small. Style longer.

From 4,000 to 6,000 feet elevation. In one specimen the leaves are larger, 8 cm. long by 5 cm. wide.

BEGONIACEAE.

41. *Begonia praeclara*, King. At 4,000-4,200 feet.

42. *B. venusta*, King. At 4,500 feet.

SAMYDACEAE.

43. *Casearia esculenta*, Roxb. At 4,000 feet.

ARALIACEAE.

44. *Brassaia palmata*, King. At 4,500 feet.

45. *Heptapleurum subulatum*, Seem. At 2,000 feet.

RUBIACEAE.

46. *Ophiorhiza communis*, Ridl. At 4,000 feet.

47. *Argostemma involucratum*, Hemsl. At 4,500 feet.

48. var. *glabrum*. At 4,000 feet.

49. *Argostemma subcrassum*, King. At 4,500 feet.

50. *Urophyllum glabrum*, Roxb. At 4,200 feet.

51. *Hedyotis capitellata*, Wall. At 2,000 to 3,500 feet.

52. *Gardenia* (*Gardeniella*) *pulchella*, Ridl. At 5,000 feet.

53. *Ixora stricta*, Roxb. At 4,500 feet.

54. *J. opaca*, Br. At 5,000 feet.

55. *Psychotria sarmentosa*, Bl. At 4,000 feet.

56. *P. Birchiana*, King. At 4,000 feet.

57. *P. MEGACARPA* *sp. nov.*

A shrub. Leaves lanceolate, acuminate, acute, base narrowed to the petiole, thinly coriaceous, 14 cm. long, 3.5 cm. wide, drying red-brown, glabrous, nerves 12 pairs, fine, meeting near the edge, petiole 1.5 cm. long, rather slender. Stipules short, ring-like. Flowers not seen. Panicles few flowered lax 6 cm. long, branches few, spreading. Fruit ellipsoid, crowned with the remains of the perianth, 1 cm. long on pedicels 1 cm. long. Seeds convex on the outer side, 6-ribbed at inner surface, flat, 6 mm. wide.

At 3,500 feet.

Allied to *P. Jackii*, with very similar leaves but very much larger fruit.

58. *Psychotria condensa*, King & Gamble. At 6,600 feet.

There are two forms of this, very different in appearance, one with distant pairs of elliptic leaves, blunt tipped 3 cm. long and 2 cm. across, and the other with smaller, more lanceolate condensed leaves, 1.5 cm. long and 7 mm. wide.

59. *Lasianthus rhinocerotis*, Bl. At 4,000 feet.

60. *LAUDICULATUS* *sp. nov.*

Branches slender, covered, with fine yellow appressed hairs. Leaves lanceolate, long caudate base sharply cuneate above, glabrous, shining, drying greenish, nerves obovate, 5 pairs beneath, glabrous, except the edges, long, ciliate and rounded midrib and elevated nerves all appressed, hairy, petiole slender 4 mm. long, silky. Stipules persistent, triangular, acute, silky. Cymules sessile, shorter than the petiole, few flowered. Bracts small. Calyx lobes ovate, acute, covered with silky yellow hairs. Corolla tube rather stout, lobes 4, ovate, triangular, acute; 4 mm. long, all hairy. Style long, protruding. At 4,500 feet.

Allied to *L. longicauda*, Hook. fil. of the Himalayas, but with leaves hairy on nerves and edges and sessile flowers.

COMPOSITAE.

61. *Gynura sarmentosa*, DC. At 3,000 feet elevation.

62. *Erigeron linifolius*, Willd. ? At 6,000 feet.

CAMPANULACEAE.

63. *Pentaphragma Scortechinii*, King. At 4,000 feet.

VACCINIACEAE.

64. *Vaccinium viscidifolium*, King & Gamble. At 4,500 feet.

Vaccinium longibracteatum, Ridl. At 5,000 to 5,500 feet elevation.

ERICACEAE.

66. *Gaultheria fragrantissima*, Wall. At 6,000 feet alt.

67. *GAULTHERIA HIRTA* *sp. nov.*

Branches flexuous, roughly hairy, with red clubbed hairs and shorter silky hair. Leaves alternate, ovate, acuminate, base rounded, red, hairy, coriaceous, paler beneath, nerves 4-5 pairs inarching within the margin, reticulations prominent, 7 cm. long, 2.5 cm. wide, petiole thick, red, hairy .4-.5 mm. long. Racemes axillary beneath, the leaf 3 cm. long, 5 to 6 flowered, hairy, pedicels .5 mm. long. Sepals 5-ovate, acuminate connate at the base for half their length. 2 mm. long, hairy outside. Corolla, tube urceolate, 6 mm. long, sparingly hairy outside, the hairs rather long, lobes 5, short, lanceolate, obtuse, glabrous within. Stamens 10, filaments glabrous half the length of the corolla. Anthers elliptic, oblong with a pair of bifurcated appendages with filiform points, orange colour. Ovary rounded, flattened, silky. Style as long as the perianth tube glabrous, pink. Stigma discoid, small.

At 5,000 feet alt.

Allied to *G. leucocarpa*, Bl. but hairy.

68. *Pieris ovalifolia*, Don. At 6,000 feet alt.

69. *Rhododendron Wrayii*, King & Gamble, 5,500 to 6,600 feet.

70. *Rhododendron Malayanum*, Jack. At 4,500 feet.

71. *Rhododendron elegans*, Ridl. At 6,600 feet.

Only previously known from Gunong Tahan.

72. *Rhododendron spathulatum*, Ridl. At 6,600 feet.

First collected at this spot by Mahommed Ariff.

73. *Pernettyopsis Malayana* King. At 6,600 feet.

EPACRIDAE.

74. *Leucopogon Malayanus*, Jack. At 4,500 feet.

MYRSINEAE.

75. *MYRSINE LANCEOLATA* *sp. nov.*

A shrub or tree with spreading branches. Leaves thinly coriaceous, lanceolate acuminate at both ends, midrib

prominent, primary nerves inconspicuous, very numerous. secondary nerves similar, reticulations fine and prominent, 12 cm. long, 2.5 cm. wide, petioles 6 mm. long, thick, rugose. Flowers not seen. Fruits on pedicels 1 mm. long, 4 or 5 together on small bosses, below the leaves. Calyx lobes ovate, acute, glandular, not ciliate. Drupe 2 mm. through globose crowned with the style, pale, reticulate with deep red glands round the style. At 5,000 feet.

Allied to *M. perakensis*, King & Gamble, but with thinner acuminate leaves.

- 76. *Labisia longistylis*, King & Gamble.
- 77. *Ardisia pachysandra*, Mez. At 4,500 feet.
- 78. *Ardisia theaeifolia*, King & Gamble. At 4,500 feet.
- 79. *Ardisia rosea*, King & Gamble. From 3,500 to 4,000 feet.
- 80. *Ardisia chrysophyllifolia*, King & Gamble. At 6,000 feet.
- 81. *Ardisia colorata*, Roxb. At 4,200 feet.

82. *EMBELIA ROTUNDIFOLIA* *sp. nov.*

Shrub, probably a climber. Leaves stiffly coriaceous, elliptic ovate, blunt, bases rounded, midrib grooved above, main nerves, secondaries and reticulations slender, prominent above, not or hardly visible beneath, densely black-dotted on both surfaces, 4.5 cm. wide, petiole 7 mm. long. Panicles very short, axillary, peduncles 2 mm. long, covered with ovate bracts, with one or two short branches, similarly bracteate, pedicels 3 mm. long. Sepals 4 connate at base, ovate, obtuse, gland-dotted. Petals free, pubescent, elliptic, somewhat clawed, glandular at the tip, 1.5 mm. long. Stamens 4, adnate to the petals near the base. Anthers ovate, notched at the base eglandular. Ovary ovoid, style cylindric, short, red, glabrous.

At 5,000 feet alt.

Curious from its rounded, almost orbicular stiff leaves and the very conspicuous glands on the sepals and petals.

APOCYNACEÆ.

- 83. *Chilocarpus costatus*, Miq. At 2,000 feet elevation.

ASCLEPIADACEÆ.

- 84. *Dischidia tubuliflora*, King & Gamble.
- 85. *Dischidia monticola*, King & Gamble. At 4,200 feet.

This appears to be a shrubby plant, and not a twiner like most species.

86. *Pentasacme caudata*, Wall. At 3,500 feet alt.

LOGANIACEÆ.

87. *Gaertnera acuminata*. Benth.

88. *G. Koenigii* var. *oxyphylla*.

This is so clearly distinct from *G. Koenigii*, Wight of Ceylon, that it is preferable to keep it a distinct species.

89. GAERTNERA CAUDATE *sp. nov.*

Stem slender, pale, corky, barked below. Leaves patent, lanceolate, caudate, base long-narrowed, acuminate, thinly coriaceous, nerves 7 pairs, reticulations visible, very fine, midrib prominent 11 cm. long, 2.5 cm. wide, glabrous, petiole 1 cm. long. Stipules tubular with a few setaceous points, 5 mm. long, uppermost shorter.

Panicle terminal lax 3.5 cm. long, with one or two branches 1 cm. long at the base, scurfy. Bracts very small, lanceolate acuminate. Pedicels 2 mm. long. Calyx broadly cup-shaped with 5 setaceous points, 2 mm. long, glabrous. Corolla funnel-shaped, base cylindric, minutely scurfy 1.5 cm. long, lobes lanceolate, shorter than the tube, inside glabrous except for long white hairs surrounding the mouth of the tube. Anthers linear in the mouth of the corolla, included.

At 4,500 feet elevation.

GENTIANEÆ.

90. *Crawfordia Blumei*, Don. At 6,600 feet.

SYMPLOCACEÆ.

91. SYMPLOCOS (CORDYLOBLASTE) CRENULATA *sp. nov.*

A shrub. Leaves oblanceolate or obovate, obtuse, crenate at the upper part with a short tooth in each crenulation, base narrowed, coriaceous, glabrous, nerves 5 pairs with the reticulations conspicuous on both surfaces, midrib stout, 4.5 to 5 cm. long, 2 cm. wide, petiole 5 mm. long. Flowers numerous, solitary, axillary, pendulous, on short (1 mm.) pedicels, silky, with 2 small ovate lanceolate silky bracts to each flower. Calyx campanulate, short, lobes 5, subacute, white, silky. Corolla tube stout, lobed nearly to the base, but adnate except the apices and margins to the staminal tube, 1 cm. long, lobes broad, obtuse, appressed hairy on two rows and towards apex, margins and inner face glabrous. Staminal tube hairy within, adnate to the corolla for most of its length lobes 15, oblong truncate, tipped by a short, free filament

Anthers small, about 40. Ovary cylindric, silky, hairy, little broader than the glabrous, stout style. Stigma pulvinate.

At 6,600 feet.

Mohamed Aniff obtained another species on Gunong Kerbau, *Symplocos obovata*, Ridl. This differs from that in the solitary flowers and crenulate leaves.

GESNERACEÆ.

- 92. *Aeschynanthus perakensis*, Ridl. At 4,000 feet.
- 93. " *longicalyx*, Ridl. At 5,500 feet.
- 94. " *Lobbiana*, Hook. fil. At 2,000 feet.
- 95. " *obconica*, Clarke. At 2,000 feet.
- 96. *Agalmyla staminea*, Bl. At 2,000 feet.
- 97. *Didissandra filicina*, Ridl. At 4,000 feet.

98. DIDYMOCARPUS (ELATÆ) ROBUSTA sp. nov.

Very tall and woody, over 60 cm. tall, stem stout 4 mm. through woolly, internodes 7 cm. long. Leaves in distinct whorls of 2 or more, ovate, thick, densely red, woolly, on both sides, equal, subacute, edges shortly bluntly toothed, base rounded, nearly aequilateral, 4.5 cm. long, 2 cm. wide; nerves 10 pairs, elevated beneath, wholly .5 mm. Cymes several from the upper axils, peduncles 16 cm. long, hairy. Bracts 2, ovate shaped, acute glabrous 5 mm. long. Calyx glabrous funnel, 1 cm. long with short distinct cusps. Corolla yellow, 1.5 cm. long, tube rather narrow at the base; gradually dilate upwards, 1 cm. across the mouth, lobes broadly rounded. Stamens 2, filaments adnate to the tube half way down included. Pistil puberulous. Style rather long, stigma spoon-shaped. Capsule cylindric 3.5-4 cm. long, glabrous, cuspidate. From 6,000 to 6,600 feet alt.

Differs from other species of the section in the thicker leaves in equal pairs or whorls, smaller and more woolly, the much longer peduncles, larger calyx and smaller corolla.

99. DIDYMOCARPUS SULPHUREA var. GRANDIFLORA, var. nov.

Differs in the calyx lobes being broadly lanceolate, acuminate, and the corolla being 3 cm. long and 1.4 cm. across. At 6,000 feet alt.

100. *Didymocarpus quinque-vulnera*, Ridl. 4,200 to 5,500 feet alt.

101. *Didymocarpus malayana*, Hook. fil. At 4,500 feet.

A variety with a white feather in the centre of the leaf.

102. *Didymocarpus hispida*, Ridley. At 6,600 feet.

103. *DIDYMOCARPUS MODESTA*, *sp. nov.*

Stem slender or moderately stout; woody, unbranched, 14 cm. tall, appressed, hairy. Leaves opposite in equal pairs, lanceolate, acuminate at both ends; entire, thin, glabrous except the edges and nerves beneath, which are hairy, nerves 4 pairs ascending, 7 cm. long, 2.2 cm. wide, petiole .5 mm. long. Flowers solitary, axillary, usually in the uppermost axil, peduncle 5.5 cm. long, hairy. Bracts narrow, setaceous, hairy, short. Calyx-lobes setaceous, deep purple, 2 mm. long. Corolla tube narrowed at the base, gradually dilated upwards, curved, sparingly hairy, lobes oblong, rounded half as long. Stamens 2, included filaments from near the base. From 3,000 to 5,500 feet elevation, var. *b. minor*. Leaves 5.5 cm. long, 1.5 cm. wide, peduncle 7 mm., much shorter than the leaves. Corolla 1 cm. long. At 3,500 feet elevation.

Perhaps nearest to *D. parviflora*, Ridl., but unbranched, with larger leaves and a curved corolla, which appears to be white or yellowish.

104. *Cyrtandra decurrens*, var. *Wallichii*. At 4,000 feet.

105. *Cyrtandra pilosa*, Bl. At 4,000 feet.

ACANTHACEAE.

106. *JUSTICIA INCONSPICUA* *sp. nov.*

Weak branching, glabrous herb. Leaves alternate, thin, ovate, lanceolate, acuminate, obtuse, base long, narrowed, usually inaequilaterally, raphides short but very abundant on both sides. 12.5 cm. long, 4.5 cm. wide or less, midrib scurfy beneath, petiole 1 cm. long. Raceme terminal 1 cm. long, few flowered, pedicel 2 mm. long. Bract narrow, lanceolate, acute erect, appressed minutely mucronate with a broad, flat elevated midrib, .5 mm. long, .1 mm. wide, as long as the corolla tube. Corolla 1.2 cm. long, tube thick, upper lobe narrowed, lanceolate, obtuse, lower with three short, blunt lobes, pubescent outside. Stamens 2, filaments stout 8 mm. long. Anthers 2, cells unequal, the lower one with a long conic point, as long as the cell. Style glabrous.

Alt. 3,600 to 4,000 feet. The flower appears to have been yellow with purple veins on the palate. The bracts are more or less tinted with purple. Allied to *J. flaccida*, Ridl. but with a much shorter spike and bracts not as long as the flowers.

LABIATAE.

107. *Gomphostemma crinitum*, Wall. At 4,000 feet.

VERBENACEAE.

108. *Vitex gamosepala*, Griff. At 4,500 feet.

NEPENTHACEAE.

109. *Nepenthes Macfarlanei*, Hemsl. 5—6,000 feet.

BALANOPHORACEAE.

110. *Balanophora gigantea*, Wall. At 4,000 feet.

PIPERACEAE.

111. *Piper magnibaccum*, DC. At 4,000 feet.

LORANTHACEAE.

112. *Loranthus pulcher*, DC. At 4,500 feet.

LAURINEAE.

113. CINNAMOMUM PARVIFOLIUM, *sp. nov.*

Tree or shrub with dense branches, bark dark, blackish brown. Leaves coriaceous, glabrous, ovate, acuminate, base rounded, subopposite or alternate, three nerves conspicuous, transverse, nervules fine, hardly visible, above glabrous, shining, 5 cm. long, 3 cm. wide, petiole 5 mm. long, Cymes 1.5 long, axillary, peduncle slender, 1 cm. long, pedicels 3 subumbellate, 5 mm. long.

Flowers 2 mm. long. Sepals 3 elliptic, obtuse. Petals, ovate, obtuse, all pubescent, silky within. Stamens 4-celled, outer row 6, filaments linear, glabrous, anther oblong, inner 3, with 2 large glands on the hairy filaments.

Staminodes 3 conic on short filaments. Ovary flask-shaped, style short.

At 4,200 feet. Remarkable for its little, stiff, ovate leaves.

114. *Alseodaphne oleifolia*, Gamble.

URTICACEAE.

115. PSEUDOSTREBLUS CAUDATUS *sp. nov.*

Glabrous, unarmed, probably a shrub, branches slender, bark black. Leaves alternate, elliptic, caudate, tip with a long, blunt point, base shortly cuneate, thinly coriaceous, nerve, horizontal, primaries about 11 pairs inarching within the margin, secondaries nearly as prominent, reticulations conspicuous beneath. Male flowers on short pedicels 2 mm. long, axillary bracts ovate, very small. Pedicels 5-6 mm. long, slender flowers crowded at the tip, 4 or 5 to each spike, sessile. Sepals 4 or 5 ovate, acute. Stamens 4-5 inflexed in bud, filaments twice as long as the sepals, flat, 2 mm. long. Anthers elliptic, rounded, Pistillode oblong, truncate. At 4,500 feet.

I am a little dubious as to the genus of this plant as I have not seen the female. I refer it to *Pseudostreblus* rather than *Taxotrophis* as it is quite unarmed and has, occasionally at least, 5 sepals and stamens.

116. *Hullettia dumosa*, King, at 4,000 feet.

117. *Ficus chartacea*, Wall. At 4,200 feet.

118. *Ficus diversifolia*, Bl. At 4,000 feet.

One form has elliptic leaves, acuminate at both ends, 11 cm. long and 2 cm. wide, a curious form.

CUPULIFERAE.

119. *Pasania grandifrons*, Gamble. 5,000 to 6,000 feet,

GNETACEAE.

120. *Gnetum Brunonianum*, Griff, at 5,000 feet.

ORCHIDEAE.

121. *Dendrobium longipes*, Hook. fil. At 6,000 to 6,600 feet.

122. *Trichotosia pyrrhotricha*, Ridl. At 3,400 to 4,500.

123. *Eria Scortechinii*, Hook. fil. At 5,500 feet.

124. *ERIA* (AERIDOSTACHYA) CRASSIFOLIA *sp. nov.*

Rhizome stout, woody, with many slender, wiry branched roots. Pseudobulbs approximate, ascending, cylindric, 5 cm. long, 1.5 cm. through, covered with brown, coriaceous, truncate sheaths, or the sheathing bases of leaves. Leaves very coriaceous, lanceolate, obtuse, or subacute, narrowed gradually to the base, 13-18 cm. long, 1.5 cm. wide or less, nerves invisible, under surface quite smooth. Scapes axillary, with a large pale papery sheathing, bract 5 cm. long, 1 cm. wide at the base. Peduncle 13 to 19 cm. long; brown, woolly. Raceme as long, dense, ovary, pedicels, rachis and outside of sepals brown tomentose. Bracts minute, acute. Pedicel and ovary 1 cm. long. Upper sepal oblong, tip rounded, lateral sepals broadly triangular, ovate, 2 mm. long, mentum cylindric, conic, obtuse 2 mm. long. Petals glabrous, linear, oblong, blunt, incurved over the column. Inner face of sepals and petals apparently bright yellow. Lip short, base very shortly narrowed, blade oblong, faintly 3-lobed apex broad, rounded, truncate, glabrous, base slightly thickened. Column stout, broad (apparently purple) face flat, a V-shaped ridge at the base, margin of clinandrium distinctly elevated all round but not tall.

From 4,000 to 6,000 feet elevation.

This resembles *E. crassipes*, Ridl. to some extent, but the petals are not lanceolate and the leaves are wider, the pseudo bulbs are different. The mentum is shorter than in *E. aeridostachya*, Lindl., *E. lorifolia*, Ridl. etc.

125. *Phreatia nana*, Hook. fil.

126. *Phaius callosus*, Lindl. At 4,000 to 5,000 feet.

127. *Arundina speciosa*, Bl.

128. *Nephelathyllum pulchrum*, Bl. At 4,500 feet.

129. *Spathoglottis plicata*, Lindl. At 2,000 feet.

130. *Spathoglottis aurea*, Lindl. Small form. At 4,500 to 6,000 feet.

131. *Dilochia Cantleyi*, Hook. fil. At 6,000 feet.

132. *Platyclinis Kingii*, Hook. fil. At 6,600 feet.

133. *PLATYCLINIS PULCHELLA*, *sp. nov.*

Pseudobulbs crowded on a rhizome 6 inches long, ovoid, conic, rugose 1 cm. long. Leaf coriaceous, lanceolate, obtuse, narrowed to base, 2—3.5 cm. long, .5 mm. wide, keel prominent beneath. Scape 9-10 cm. long, base (3-4 cm.) nude. Flowers crowded, numerous. Bracts narrow, lanceolate 2 mm. long, longer than the pedicel and ovary. Sepals lanceolate, acute, 7 mm. long, 2 mm. wide at the base. Petals a little shorter, the two outer nerves curve in and join the median about the middle of the sepals and petals. Lip pandurate, basal wings rounded, denticulate with short, acute, free points, middle ovate, acute, keels 2 from the base brown, incurving, ending on the base of the midlobe, median nerve straight elevate running to end of midlobe. Column slender, curved, stelidia linear, acuminate from near the base, winged to the base, nearly as long as the column. Hood of clinandrium ovate, rounded, entire.

From 5,500 to 6,600 feet. The flowers apparently yellow or green, with the outer raised veins brown. The lip has much the shape of that of *P. latifolia*.

134. *PLATYCLINIS CARNOSA* *sp. nov.*

Rhizome long, woody, pseudo-bulbs conic, 2 cm. long, 5 mm. through at base, 1-5 cm. apart. Leaves coriaceous, elliptic, lanceolate, obtuse, base slightly narrowed, 6-5 cm. long, .6 mm. wide, nerves 6.7, petiole stiff, 1 cm. long. Scape nodding 14 cm. long, basal half nude. Bracts lanceolate, obtuse, longer than the pedicel and ovary 3 mm. long. Flowers numerous, fleshy. Sepals broadly lanceolate, obtuse. Petals shorter, 5 mm. long, 2 mm. wide, nerves 3, incurving into the median at the tip. Lip fleshy, side-lobes minutely

denticulate, free points distinct, lanceolate, acuminate, curved outwards, ridges elevate 2, short, dark-coloured, rising from the base to near the middle, midlobe ovate, acuminate, acute denticulate. Column short, thick, straight, apex hooded, hood tall, oblong toothed. Stelidia short from near the stigma, broad, acuminate, upcurved.

At 6,600 feet. Remarkable for its fleshy flowers.

135. *PLATYCLINIS GRAMINEA* sp. nov.

Rhizome woody, stout, 4 mm. through, pseudo-bulbs elongate conic, cylindric, 3 cm. long, 4 mm. through at the base. Leaf long, lanceolate, acuminate, long-narrowed to the base, thin, grassy, membranaceous, subacute, mucronulate, nerves 2 pairs, fine; midrib conspicuous, 16 cm. long, 1.5 cm. wide; petiole 7 mm. long. Scape enclosed with the petiole in a narrow tubular sheath at the base, 6.5 cm. long, slender, 30 cm. long, lower half nude. Flowers numerous, small. Bracts lanceolate, acuminate, much longer than the ovary and pedicel, 2 mm. long. Sepals lanceolate acuminate, narrow, acute, 1-nerved, 4 mm. long, 1 mm. across, at base. Petals $\frac{2}{3}$ as long. Lip very narrow; nearly entire, lanceolate, acute with 2 thin raised keels at the base, side lobes indistinctly marked; free points minute. Column straight. Stelidia from near the stigma broad-based, apices, acuminate, acute, shorter than the column. Clinandrium, hood ovate 2-3, toothed at the tip. Anther ovoid, pyriform-acute.

At 5,500 and 6,000 feet.

Allied to *P. linearis*, Ridl. but smaller, with a different lip.

136. *COELOGYNE RADICOSUS* sp. nov.

Rhizome stout, woody, branched, with numerous long, thick, wiry roots, 4 mm. in diameter. Pseudo-bulbs narrow, cylindric, 6 cm. long, 4 mm. through when dry, 2 cm. apart. Leaves 2, coriaceous, lanceolate, acute, narrowed to a stout petiole, 9 cm. long, 2 cm. wide, 5 nerved, petiole 1 cm. long. Scape from between the leaves, 11-13 cm. long, slender, erect, peduncle about as long as the raceme, flattened; slightly ancipitous. Raceme flexuous, few flowered. Bracts caducous, the lower one lanceolate, acuminate 1.5 cm. long. Pedicel 3 mm. long. Sepals linear, oblong, obtuse, 12, mm. long, 2 mm. wide, 6-nerved. Petals as long, linear, filiform, very narrow. Lip shorter, lateral lobes curved, apices lanceolate, as long as the column; midlobe longer, flabellate, rounded, 2 semi-elliptic, thin, flat keels on the disc. Column rather short, hardly curved; margin of clinandrium large, ovate, obtuse, entire. Rostellum large, rounded.

At 6,600 feet. A single specimen.

Allied to *C. cuprea*, Wendl., but with much smaller flowers and different keels.

- 137. *Coelogyne carnea*, Hook. fil.
- 138. *Dendrochilum album*, Ridl. At 6,000 feet.
- 139. *Dendrochilum angustifolium*, Ridl. At 6,000 feet.
- 140. *Saccolabium bigibbum*, Lindt. At 4,200 feet.
- 141. *Podochilus cornutus*, Schlechter. At 2,000 feet.
- 142. *Podochilus unciferus*, Hook. fil. At 2,300 feet.
- 143. *Aphyllorchis pallida*, Bl. At 3,500 feet.

144. *VANILLA MONTANA* sp. nov.

A long, stout climber. Leaves fleshy, lanceolate, acuminate, obtuse at the tip; narrowed to a rather broad base, 12-14 cm. long, 3.5 cm. across. Racemes axillary, 1 cm. long, few flowered. Bracts orbicular, rounded, 2 mm. long. Sepals oblanceolate, sub-spathulate acute; nerves 7, undulate, 5 cm. long .7 mm. wide. Petals similar but smaller. Lip 4.2 cm. long, base narrow, adnate to the column; limb long trumpet-shaped, 2 cm. across at the mouth, margin in the centre with filiform processes. Callus in the mouth, broad, fan-shaped, pectinate with linear acute teeth. Column 4 cm. long. Clinandrium margin tall, hooded, bilobed, obtuse, rounded. Rostellum broad, oblong, truncate, entire. Fruit (pressed) oblong, broad, 8 cm. long .2 cm. across.

Perak, Gunong Kerbau 4,400 to 4,500 feet.

SCITAMINEAE.

- 145. *Globba pendula*, Roxb. At 2,000 feet. The same plant as grows at the Penang waterfall.
- 146. *Globba cernua*, Bak. At 4,000 feet.
- 147. *Globba violacea*, Ridl. At 4,000 feet.
- 148. *Globba perakensis*, Ridl., var. with more elongate panicle.
- 149. *Camptandra ovata*, Ridl. At 4,200 feet.
- 150. *Conamomum citrinum*, Ridl. At 4,000 feet.
- 151. *Alpinia aurantiaca*, var. *hirtior*. Much more hairy than the type, the petals quite silky, hairy outside.

APOSTASIACEAE.

- 152. *Abostasia Wallichii*, Lindl. At 4,000 feet.

AMARYLLIDAEAE.

153. *Curculigo latifolia*, Dryand. At 4,000 feet.
A form with long, narrow leaves.

BURMANNIACEAE.

154. *Burmannia longifolia*, Becc. At 6,000 feet.

LILIACEAE.

155. *Protolirion paradoxum*, Ridl. At 6,600 feet.
"Chinduai" of the Sakais.
156. *Peliosanthes stellata*, Andr. At 4,000 feet.
157. *Tupistra grandis*, Ridl. At 4,500 feet.
158. *Dracaena elliptica*, Thunb. At 4,200 feet.
159. *Dracaena robusta* Ridl? In fruit only.
160. *Rhuacophila javanica*, Bl. At 4,500 to 5,000 feet.

TRIURIDAEAE.

161. *Sciaphila affinis*, Becc. At 3,500 feet.

FLAGELLARIEAE.

162. *Joinvillea Malayana*, Ridl. At 4,000 feet.

PALMAE.

163. *Areca pumila*, Bl. At 4,000 feet.
164. *Penanga Scortechinii*, Becc. At 3,500 to 4,000 feet.
165. *Penanga subintegra*, Ridl. At 3,500 feet.
166. *Iguanura polymorpha*, Becc. At 4,200 feet.
167. *Iguanura Wallichiana*, Hook. fil. At 3,000 to 4,000 feet.
168. *Licuala Kingiana*, Becc. At 4,000 feet.

169. *CALAMUS PACIFICUS* sp. nov.

Almost entirely unarmed. Leaf-sheaths with a few flattened, light-brown grey-tipped thorns 4 mm. long, leaf-blade quite unarmed, 105? cm. long; petiole subterete, smooth .5 cm. through, 100? cm. long; leaflets linear, acuminate with a long point, smooth, 3-nerved, two side nerves faint, glabrous except for a few black bristles at the tip. 22 cm. long, 1.4 cm. wide. Spadix slender, 98 cm. long, base (32 cm.) nude except for two narrow, flat spathes with lanceolate points, entirely

unarmed; branches 4, about 15 cm. long with 8-13; flower-spikes slender, spreading, 5 cm. long. Spathels 1 cm. longer, less tubular with an acuminate limb. Spathellules ovate, cup-shaped with a long point, ribbed. Bracts ovate, short. Calyx wide, cup-shaped, obscurely 3-lobed with obtuse lobes. Petals 3 cm., oblong, striate. At 4,000 feet.

Allied to *C. Diepenhorstii*, Miq. var. *'singaporensis'* but almost completely unarmed. The specimens show no flagella

ARACEÆ.

170. *Arisaema Roxburghii*, Kunth. At 3,500 to 4,200 feet.

171. *Homalonena pumila*, Hook fil. A variety with the leaves hardly pustulate. At 4,500 feet.

CYPERACEÆ.

172. *Kyllinga brevifolia*, Rottb. At 4,000 feet.

173. *Fimbristylis globulosa*, Kunth. At 3,000 feet.

174. *Hypolytrum latifolium*, Rich. At 3,500 feet.

175. *Gahnia javanica*, Mor. 5,500 to 6,600 feet.

176. GAHNIA CASTANEA sp. nov.

Large tufted plant. Leaves with a broad (2 cm. wide) shining purplish-brown, sheathing base, gradually narrowing to a filiform point 100 cm. long. Panicle 45 cm. long, with spikelets borne on slender scabrid peduncles, about 50 from the axil of a long leafy bract, 2-3 cm. long, with 5 or 6 spikelets towards the apex. Glumes lanceolate, mucronate, chestnut-red, lower one tubular at the base, enclosing 2 or 3 branchlets. Spikelets one-flowered 4 mm. long with imbricate glumes. Stamens 3, with very long filaments, and linear long-acuminate anthers. Ovary cylindric, style very long, black with three long filiform stigmatic arms.

This species is very different from *G. javanica* in having fewer glumes; the flower certainly appears terminal.

177. *Lepidosperma chinense*, Nees. At 6,600 feet.

Occurs also on Mt. Ophir and Gunong Tahan.

178. *Carex Walkeri*, Arn. At 6,600 feet elevation.

A fine addition to our flora, and very fine specimens. The glumes in this form are very conspicuously scarious at the tip.

Native of South India, Ceylon and Java and the Philippines.

179. *Scleria radula*, Hance. At 4,200 feet elevation.

GRAMINEÆ.

180. *Isachne javana*, Nees. At 6,600 feet.

181. *I. Kunthiana*, W. & Arn.

The same form as that obtained on Mt. Kinabalu by Dr. Haviland, and very different from the lowland plant of the Malay Peninsula said to be *I. Kunthiana*, notably in its glabrous glumes and the denticulate edge of the leaf.

182. *Panicum indicum*, L. At 3,000 feet alt.

FILICES.

183. *Alsophila dubia*, Bedd. At 3,500 feet.

184. *Cibotium Barometz*, Link. From 3,500 to 4,000 feet

185. *Hymenophyllum Smithii*, Hook. At 6,500 feet.

186. *Trichomanes pyxidiferum*, L. At 5,000 feet.

187. *Trichomanes pallidum*, Bl. At 6,600 feet.

188. *Trichomanes pluma*, Hook. At 6,000 to 6,600 feet.

189. *Trichomanes gemmatum*, Sm. At 5,500 feet.

190. *Trichomanes apiifolium*, Presl. At 5,500 to 6,000 feet.

191. *Trichomanes maximum*, Bl. At 4,000 feet.

192. *Prosaptia Emersoni*, Presl. At 4,200 feet.

193. *Prosaptia contigua*, Sw. At 4,500 to 5,000 feet.

194. *Davallia moluccana*, Bl. At 4,500 feet.

195. *Lindsaya scandens*, Hook. At 4,000 feet.

196. *Lindsaya flabellulata*, Hook. At 6,000 feet.

197. *Schizoloma lobata*, Pers. At 4,000 feet.

198. *Litobrochia incisa*, Thunb. At 4,200 feet.

199. *Lomaria procera* var. *vestita*. At 6,600 feet.

200. *Diplazium porrectum*, Wall. At 5,000 feet.

201. *Diplazium asperum*, Bl. At 5,000 feet.

202. *Diplazium bantamense*, Bl. At 4,000 feet.

203. *Diplazium sylvaticum*, Presl. At 5,000 feet.

204. *Didymochlaena lunulata*, Desv. At 4,500 feet.

205. *Lastraea calcarata*, Bl. At 4,200 feet.

206. *Nephrodium truncatum*, Presl. At 5,000 feet.

207. *Nephrodium davallioides*, Kze. At 4,000 feet.

208. *Oleandra neriformis*, Cav. At 4,200 to 5,000 feet.
209. *Polypodium nutans*, Bl. At 6,000 feet. Only known previously from Mt. Ophir and that dubiously.
210. *Pleopeltis musæfolia*, Bl. At 4,200 feet.
211. *Gymnogramme calomelanos*, Kaulf. At 4,000 feet.
212. *Vittaria elongata*, Sw. At 5,200 feet.
213. *Tænitis blechnoides*, Sw. At 4,200 feet.
214. *Chrysodium bicuspe*, Hook.

LYCOPODIACEÆ.

215. *Lycopodium filiforme*, Roxb. At 4,000 feet.
216. *Lycopodium casuarinoides*, Spring. At 6,600 feet.
217. *Selaginella Wallichii*, Spring. At 3,500 feet.
218. *Selaginella Morgani*, Zeill. At 6,000 feet.

MISCELLANEA.

THE VERTEBRATE COLLECTIONS OF THE FEDERATED MALAY STATES MUSEUMS.

The collection of terrestrial vertebrates from the Malay Peninsula in the possession of the Federated Malay States Museums is now so nearly complete that it may be of interest to give some comparative figures concerning it.

In 1899 and 1900, Capt. Stanley Flower, then in charge of the Bangkok Museum, devoted much attention to the mammalian fauna of Siam and the Malay Peninsula, and, after studying all the available collections both local and in the British Museum, compiled a list which is published in the *Proceedings of the Zoological Society of London*, 1900, pp. 306-379. A summary of his list gives the following figures:

| | | | Species. |
|-------------|-----|-----|----------|
| Primates | .. | ... | 10 |
| Carnivora | ... | ... | 28 |
| Ungulata | ... | ... | 14 |
| Rodentia | ... | ... | 30 |
| Insectivora | ... | ... | 6 |
| Cetacea | ... | ... | 5 |
| Sirenia | ... | ... | 1 |
| Edentata | ... | ... | 1 |
| Chiroptera | ... | ... | 39 |
| Total | | | 134 |

The intensive study of mammals can only have said to have begun with the opening days of the present century, and since 1899 very great attention has been paid to the Malaya Peninsula and region, principally by Doctor W. L. Abbott, of Philadelphia, whose collections have been worked out by Messrs. G. S. Miller and M. W. Lyon of the United States National Museum at Washington, and by the Federated Malay States Museums. It had been pointed out by English naturalists and by the authorities of the British Museum that it was unfortunate that the proper study of the fauna of a British Possession could only be effectively carried out in a foreign Museum, owing to the lack of modern material in the national collection. As a result, since 1908 very much of the energy of the Museum staff and considerable sums of money have been devoted to removing this reproach. After five years' work, figures dealing with the mammalian fauna of the Malay Peninsula now stand as follows:

NUMBER OF RACES OF MAMMALS KNOWN FROM THE MALAY
PENINSULA AND ADJACENT ISLANDS, 1913.

| | Total Number. | Number in Federated Malay States Museums. |
|-------------|---------------|---|
| Primates | ... 20 | ... 19 |
| Carnivora | ... 34 | ... 32 |
| Ungulata | ... 22 | ... 19 |
| Chiroptera | ... 63 | ... 46 |
| Insectivora | ... 26 | .. 24 |
| Rodentia | ... 118 | ... 112 |
| Cetacea | ... 8 | ... 4 |
| Sirenia | ... 1 | ... — |
| Edentata | ... 1 | ... 1 |
| | --- | --- |
| Total | ... 293 | ... 257 |
| | --- | --- |

Of the additions to the list 71 races have been described either from material actually in the Federated Malay States Museums or from specimens collected and sent to the British Museum.

The 36 forms not represented in the local Museums with the localities from which they were obtained are as follows:

1. *Macaca capitalis* Trang.
2. *Arctonyx dictator* Trang.
3. *Lutra macrodus* ?
4. *Bos sondaicus butleri* Perak.
5. *Tragulus stanleyanus* Uncertain.
6. *Rhinoceros sondaicus* —
7. *Sciuropterus genibarbis malaccanus* ... Malacca.
8. *Pteromyscus pulverulentus* ... Malacca.
9. *Sciuropterus phayrei* North Malay
Peninsula.
10. *Sciurus caniceps epomophorus* ... Salanga Island.
11. *Epimys pullus* Tioman Island.
12. *Gunomys varius varillus* ... Penang Island.
13. *Ptilocercus lowi continentis* ... Klang Gates,
Kuala Lumpur.
14. *Gymnura gymnura* South Malay Pen-
insula.
15. *Balænoptera indica*
16. *Physeter macrocephalus*
17. *Steno plumbeus*
18. *Sotalia sinensis*
19. *Halicore duyong*
20. *Pteropus intermedius* Trang.
21. *Rhinopoma microphyllum* ... Ghirbi.
22. *Taphozous saccolæmus* Peninsula.
23. *Chærephon plicatus* Peninsula.
24. *Chærephon johorensis* Johore.
25. *Myotis oreias* Singapore.
26. *Myotis emarginatus* Biserat.

| | | | |
|-----|----------------------------------|-----|----------------------|
| 27. | <i>Pipistrellus imbricatus</i> | ... | ... Peninsula. |
| 28. | <i>Pipistrellus ridleyi</i> | ... | ... Selangor. |
| 29. | <i>Pipistrellus tenuis</i> | ... | ... Penang. |
| 30. | <i>Hesperoptenus tomesi</i> | ... | ... Malacca. |
| 31. | <i>Chilophylla hirsuta</i> | ... | ... Port Swettenham. |
| 32. | <i>Rhinolophus coelophyllus</i> | ... | ... Kedah. |
| 33. | <i>Hipposideros stoliczkanus</i> | ... | ... Penang. |
| 34. | <i>Petalia tragata</i> | ... | .. Peninsula. |
| 35. | <i>Kerivoula picta</i> | ... | Penang. |
| 36. | <i>Kerivoula bicolor</i> | ... | ... Jalor. |

The original specimens of Nos. 2, 4 and 13, which were at the time unique, have been deposited in the National Museum at South Kensington.

Of the remaining 33, 26 species are of marine or nocturnal habits and are, therefore, difficult to obtain; *Gunomys varius varillus* is an introduced form in Penang; *Epimys pullus* is a small rat from Tioman known from one specimen only, while *Tragululus stanleyanus*, though said to occur in Batang Padang, has never been obtained of late years. The last species *Gymnura gymnura* is the southern race of the common *tikus bulan* found throughout the Peninsula.

The total number of birds ascribed to the Malay Peninsula on any evidence, good, bad or indifferent, is now 654. Of these, 26 are either species identical with other forms or which have been recorded from the region erroneously or on the strength of wrongly identified or captive specimens, leaving 628 species about which no doubt exists.

Of these the Federated Malay States Museums possess specimens of 589, leaving 39 species still to be procured. Of these 39, we have at different times possessed examples of six, which have either been transferred to the British Museum or perished from defective preservation. Of the remaining 33 forms, four are oceanic birds, rarely approaching land, six are marsh or shore birds, nine are migratory species only resting in the Peninsula for very short periods on their way north or south, two are owls of extreme rarity, one (*Acridotheres torquatus*) is known from one specimen only which ought to be in the Singapore Museum but cannot now be found, while the remaining eleven are known almost entirely from the extreme north of the Peninsula, though one (*Cyornis ruecki*) of very doubtful validity is described from Malacca.

The only additions to be looked for are, therefore, either occasional migrants or actual novelties, which are necessarily few and far between, as, ornithologically speaking, the Malay Peninsula is better known than almost any other area of equal extent in Asia.

As showing the advance that has been made in the last thirty years, Hume, in 1880, gives the number of birds actually known from the Malay Peninsula as 459, of which he had procured 415. The corresponding figures are now 628 and 589, or increases of 34.6 and 41.9 per cent., respectively.

SPECIES RECORDED FROM THE MALAY PENINSULA BUT NOW
REMOVED FROM THE LIST FOR VARIOUS REASONS.

- 28.* *Carpophaga griseicapilla*
(Wald.) Wrong identification, = *C. badia* (Temm.)
34. *Turtur humilis* (Temm.) ... Specimens almost certainly caged.
53. *Seena seena* (Sykes.) ... Specimens examined = *Sterna media* (Horsf.)
55. *Sterna longipennis*, Nordm. *Sterna tibetana*, Saunders,
80. *Himantopus himantopus*
(Linn.) Transposed label.
130. *Nyroca fuligula* (Linn.) ... Alleged collector obtained the dry skin only; real locality therefore doubtful.
175. *Falco severus*, Horsf. ... No definite locality.
183. *Scops sunia*, Hodgs. ... = *Scops malayana*, Hay
220. *Halcyon humii*, Sharpe ... Identical with *H. armstrongi*, Sharpe.
307. *Iyngipicus pumilus*,
Hargitt Not separable from *I. canicapillus*, Blyth.
310. *Dendrocopus analis* (Horsf.) No authentic locality or collector.
316. *Micropternus phæocephalus*,
Blyth Specimen identified as such is *M. brachyurus* (Vieill.)
353. *Cyornis tickellæ*, Blyth ... Specimens identified as such are *C. sumatrensis*, Sharpe.
354. *Cyornis frenata*, Hume ... Female of *C. erythrogaster*, Sharpe.
357. *Cyornis turcosa*, Bruggem ... Female of *C. elegans* (Temm.)
384. *Stoparola melanops* (Vig.) Specimens identified as such are *S. thalassinoides* (Cab.)
425. *Pycnonotus blanfordi*, Jerd. *P. robinsoni*, Grant.
390. *Pericrocotus fraterculus*,
Swinh. Specimens identified as such are *P. flammifer*.
455. *Setaria melanocephala*,
Davison Type and topotypes are indistinguishable from *S. affinis* (Blyth).
- 463A. *Stachyris nigriceps* (Hodgs.) *C. davisoni*, Sharpe

* The numbers quoted are those of "A Hand-list of the Birds of the Malay Peninsula, south of the Isthmus of Kra" by H. C. Robinson, Kuala Lumpur, 1910.

- | | | |
|-------|------------------------------------|---------------------------------------|
| 476A. | Myiophoneus temmincki, Vig. | <i>M. crassirostris</i> , Robinson |
| 557. | Sturnia malabarica (Gm.) | Escaped cage bird or transposed label |
| 558. | Sturnia nemoricola (Jerd.) | Do. do. |
| 562. | Sporæginthus amandava (Linn.) | Do. do. |
| 563. | Sporæginthus flavidiventris (Wall) | Do. do. |
| | Ruticilla aurorea, Temm. | No authentic locality. |

SPECIES UNDOUBTEDLY OCCURRING IN THE MALAY
PENINSULA BUT NOT REPRESENTED BY LOCAL SPECIMENS
IN THE FEDERATED MALAY STATES MUSEUMS.

14. Rheinwardtius nigrescens, Rothsch.
 48. Porphyrio edwardsi, Elliot.
 64. Anous stolidus (Linn.)
 65. Micranous leucocapillus, Gould.
 67A. Hoplopterus ventralis (Wagl.)
 73. Ochthodromus veredus (Gould).
 104. Thaumatis b. gigantea (Oust.)
 107. Leptoptilus dubius (Gm.)
 131. Plotus melanogaster (Gm.)
 133. Phalacrocorax javanicus (Horsf.)
 134. Fregata aquila (Linn.)
 136. Phæthon indicus, Hume.
 138. Pelecanus roseus, Gm.
 142A. Neophron ginginianus (Lath.)
 145. Circus pygargus, Linn.
 157. Circaetus hypoleucus (Pall.)
 179. Asio otus (Linn.)
 192A. Glaucidium radiatum (Temm.)
 194. Strix javanica (Horsf.)
 203. Coracias affinis, McClell.
 208. Pelargopsis burmanica, Sharpe.
 245. Collocalia gigas, Hartert.
 268. Cuculus canorus, Linn.
 275. Chalcococcyx basalis (Horsf.)
 302. Gecin. robinsoni, Grant.
 324. Hemicercus canente (Less.)
 351. Cyornis ruecki, Oust.
 414. Microtarsus cinereiventris (Blyth).
 416. Criniger salangæ, Sharpe.
 441. Timelia jerdoni, Walden.
 491. Oreocichla affinis, Richm.
 507. Sutoria sutoria (Forst.)
 517. Acanthopneuste trochiloides, Sundev.
 520. Acanthopneuste magnirostris (Blyth).
 544. Dicrurus nigrescens. Oates.
 560. Acridotheres torquatus (Davison).
 572. Chlorura sp.
 576. Motacilla feldeggii, Mich.
 579. Motacilla taivanus, Swinh.

THE SEMANG BETWEEN JANING AND RAMAN.

by

F. O. B. DENNYS.

[During a recent conversation with Mr. F. O. B. Dennys, of Taiping, he mentioned to me that he had once met a tribe of naked Semangs in the far north of Perak. As I believe that there is so far no record of any tribe in the Peninsula absolutely dispensing with clothes I asked him to write down what he could remember about them. This he has very kindly done in a letter from which I have made the following extract. I. H. Evans.]

"About 1897 I went on a prospecting tour from Janning up to Rhaman and after leaving Janning on elephants we went through rather hilly country. On our second day away—I should say about 1,500 feet above sea level—we got to a fairly large stream and noticed that there were the remains of a Sakai camp. The Malays said they were Semangs and I told the *Gěmbala* to try and make them come and see me if he could find any and after a good deal of trouble he managed to get some of them to come near our camp. They were rather short and very dark skinned, with very close, curly hair—rather heavy about the shoulders in build, put poor below the belt. They did not understand Malay, but the *Gěmbala* (elephant driver) could make himself understood. After giving them some tobacco and rice they got more friendly and others appeared, in all about 15 to 20 turned up, and I noticed they were no clothes of any description, either men or women, and I think there were about 6 or 7 women. This was the cause of some amusement to my followers, who said only monkeys went naked. I got the *Gěmbala* to show me their present camp and I noticed they had small shelters built up in trees, but nothing on the ground. They could hardly be called huts as there were sticks to act as a flooring and the roofing was of leaves. This is all I can remember of the Semangs."

IX. MEASUREMENTS OF SOME SAKAI OF SUNGKAI AND SLIM, SOUTH PERAK, WITH NOTES ON THE SAME (Plates I—XXIII).

By C. BODEN KLOSS, F.R.A.I.

NOTES.

The hair of all these people was black; by which is meant a sooty or rusty tint, not a shining or dead black colour. The colour of their skin varied between tints 3 and 4 of Broca. Their bodies were in normal condition, neither stout nor thin, and generally bore only slight traces of hair, though a few individuals were glabrous. All called themselves "Senoi," all were bilingual and all the parties met with had "penghulu" sometimes two or three to a party. They had *nó bomor* or *pawang*.

Nos. 1—5 (*see* Table of Measurements).

Living between the road and the railway line about two miles south of Sungkai Station in small clearings cultivated with rice, bananas, sugarcane and tapioca. The floors of some of the houses in this settlement were barely raised above the ground, others were from three to six feet high and beneath these latter goats were penned. Roofs were of lalang grass, walls of palm leaf and floors of bamboo, covered with pandanus mats, some of which were very finely woven. Three or four blowpipes and quivers were obtained and a few arrows. These weapons were made by the Sakai of the hills and evidently were very little used by these people, who owned several old muskets. Malay garments were in general use and also common forms of Malay utensils and implements, such as rice strainers and winnowers.

Some of this party gave their tribal name as "Senoi Sakai Burong." The quiver-cover was of rattan, circular, and flattened on top.

Nos. 6—7.

Came from some miles up the Sungkai river. Both appeared to have retained their primitive condition, wore bark cloth 'chawat,' and had forehead and nose streaked with vertical blue lines. Both suffered from skin disease. The quiver cover was of pandanus leaf, elongate, triangular and flattened on top.

Nos. 8—13.

Members of a group of 10 individuals, men, women and children, felling jungle on contract for a rubber estate near Sungkai. One or two of the party wore bark cloth 'chawat,' the remainder possessed Chinese trousers or Malay sarongs.

September, 1915.

Said to be from the Ulu Sungkai and called themselves "Senoi." Skin disease (Kurap) was very prevalent among these people.

Nos. 14—31.

Living near Jeram Kawan on the Sungkai River or higher up in the hills. Houses built on piles 3-6 ft. high, bertam palm roof and sides, bamboo floors: clearings contained tapioca, sugarcane, bananas, with langsat and durian trees. A few small dogs were to be seen, generally tied by a hind leg to a house post.

This party were free from "Kurap." Many had painted their faces, the pattern consisting of either a red or yellow ground on which black markings were laid. The painting on the women was more ornate than on the men; girl children were less elaborately decorated than the adults. The latex of the Jelutong tree (*Dyera costulata*) was used for this purpose.

The men wore bark-cloth 'chawat,' fillets of bark-cloth twisted round grass with pendants of grass overhanging the nape, also woven fillets of palm leaf. Women all wore either sarongs or sheets of bark-cloth supported by a belt in which they kept young squirrels or rats, suckling them from time to time. Other ornaments were ear plugs of leaves, leaf decoration in their chignons, hair combs and skewers: attached to their girdles were bunches of sweet-scented grasses and fibre. The principal use of the combs was for scratching the scalp when parasites became too active. Both sexes wore nose skewers up to 8 or 9 inches in length, bracelets and necklaces of coloured beads and seeds and silver rings.

This group had no dances but sang well. Women sat pounding on stones with the end of a short piece of bamboo closed by its internode (chentukn) while the men sat and sang together. The form of quiver cover was similar to that used by Nos. 1—5.

| | | |
|---------------------------------|-----|----------|
| Men's head fillets | ... | Chĩnkoi. |
| Bark cloth of men's fillets | ... | Galūk. |
| Creels or small bark baskets | ... | Raga. |
| Small pouches for tobacco, etc. | ... | Tapok. |
| Leaf bunches worn by women | ... | Běnmong. |
| Woman's ear ornaments | ... | Slebak. |
| Woman's combs | ... | Soréh. |

Nos. 32—35.

Living in a clearing, a couple of miles south of Slim near the road, in two very substantial houses of bertam with bamboo floors raised 5 ft. The only true Sakai objects in their possession were blow pipes and quivers; all their implements, though made by themselves, were of Malay type. In threshing padi, of which they possessed a quantity, they placed a heap of ears in a mat and rubbed the grains out with the feet; I saw them spear water tortoises in the stream by means of a long

sapling fitted with an iron head. Here was obtained a beautifully ornamented blow pipe and a quiver with a slightly conical cover, both made by one of this party. The maker (a Mai Darat Senoi) stated that blow pipe covers are made by individuals to suit their own fancies, either like this specimen or with the flattened tops as seen in the other groups. These people wore clothes (jackets and trousers) and had attained a social state which they were superficially at any rate most unattractive, the reason given by one man for a shaven head was that previously bugs had worried him unbearably.

Nos. 36—39.

Came into Slim from the hills. Three out of the four were more or less clothed in Malay cotton garments.

Nos. 40—52.

Came into Slim from the Sungei Muda. Except for the headman, who wore a wreath, the males were undecorated save for face paint. The costume and ornaments of the women resembled those of the Jeram Kawan Sakai but they had, in addition, lavishly ornamented their heads with pink *Ixora* flowers. With regard to face painting, combs and blow-pipe patterns it was stated that these were used at will and that whatever was fancied was drawn. No patterns were private property, none had any significance however used, being merely ornamental to suit the maker's taste and all had been employed from time beyond memory. Faces are painted for songs, weddings and any occasions of a ceremonious nature (such as a visit to a European). There were no dances.

No. 53.

From Sungei Kol above Sungei Muda. The only member of the group (three *klamin*, one *penghulu*) inhabiting that locality remaining, the rest having crossed the hills for a long visit to Pahang.

| | | | | | | | |
|----------------------------|----|----|--|---------------------------------------|--|------------------------|--------------------|
| Number | .. | .. | 1 | 2 | 3 | 4 | 5 |
| Sex | .. | .. | M. | M. | M. | M. | M. |
| Age | .. | .. | 35 | 45 | 20 | 25 | 30 |
| Name | .. | .. | Rang | Jinrus | Pulai | Git | Jahya |
| Height of Stature | .. | .. | 1,592 | 1,544 | 1,510 | 1,472 | 1,554 |
| Girth of Chest | .. | .. | 797 | 752 | 786 | 750 | 822 |
| Vertex to Tragus | .. | .. | 138 | 129 | 131 | 131 | 136 |
| Length of Head | .. | .. | 180 | 172 | 182 | 174 | 180.5 |
| Breadth of Head | .. | .. | 141 | 137 | 139 | 138 | 146 |
| Length of Face | .. | .. | 106 | 100 | 111 | 106 | 110 |
| Breadth of Face | .. | .. | 133 | 129 | 130 | 129 | 135 |
| Bigonial breadth | .. | .. | 125 | 114 | 109 | 110 | 122 |
| Length of Nose | .. | .. | 40 | 44 | 45 | 44 | 46 |
| Breadth of Nose | .. | .. | 42 | 42.5 | 43 | 38 | 39 |
| Interocular Breadth | .. | .. | 32 | 31 | 35 | 32 | 32 |
| Cephalic Index | .. | .. | 78.3 | 79.8 | 76.4 | 79.9 | 80.8 |
| Cephalic Height Index | .. | .. | 76.6 | 75.0 | 72.0 | 75.2 | 75.3 |
| Facial Index | .. | .. | 79.7 | 77.5 | 85.1 | 82.2 | 83.0 |
| Nasal Index | .. | .. | 105.0 | 96.5 | 95.5 | 86.3 | 84.8 |
| Hair Character | .. | .. | Curly | Curly | Very curly | Curly | Curly |
| Hair on Face | .. | .. | Slight | Marked | Very slight | Very slight | Medium |
| Eye Plane | .. | .. | Slightly oblique | Slightly oblique | Slightly oblique | Slightly oblique | Slightly oblique |
| Epicanthus | .. | .. | Medium | Very slight | Slight | Slight | Very slight |
| Nose | .. | .. | Short, broad, nearly straight, turned-up | Straight, short, broad, tip depressed | Short, broad, nearly straight, tip flattened | Short, broad, straight | Straight |
| Nasal Bridge | .. | .. | Nearly absent | Medium | Medium | Medium | Medium |
| Lips | .. | .. | Medium | Medium | Medium | Rather thin | Thick |
| Prognathism | .. | .. | Slight labial | Slight labial | Slight labial | Slight labial | Slight labial |
| Chin | .. | .. | Square | Round | Retreating | Retreating | Pointed retreating |
| Shape of Face | .. | .. | Shield | Shield | Short oval | Shield | Shield |
| Prominence of Cheek-bones. | .. | .. | Marked | Slight | Slight | Slight | Medium |

| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|--------------------------------|-------------------------|-----------------|----------------------------|--------------------|-------------------------------|-----------------------------------|
| M. | M. | M. | M. | M. | M. | F. |
| 20-25 | 36 | 45 | 20 | 20 | 40 | 20 |
| Ba-hi-luk | Pa Luchong | Chëgam | Nün-chuk | Nia | Chim-bo | Ko-eb |
| 1,533 | 1,522 | 1,491 | 1,505 | 1,626 | 1,533 | 1,400 |
| 877 | 774 | 736 | 755 | 785 | 795 | .. |
| 141 | 135 | 138 | 139 | 141 | 138 | 137 |
| 187.5 | 177 | 173 | 172 | 184 | 183 | 165 |
| 148 | 141 | 139 | 143 | 147 | 138 | 136 |
| 115.5 | 116 | 97 | 102 | 108 | 124 | 95 |
| 142 | 132 | 131 | 124 | 133 | 131 | 120 |
| 122 | 116 | 111 | 110 | 121 | 107 | 108 |
| 55 | 55 | 45 | 43 | 47 | 53.5 | 39 |
| 44 | 35 | 43 | 38 | 40 | 49 | 38 |
| 35 | 31.5 | 32 | 32 | 36 | 36 | 38 |
| 78.9 | 79.6 | 78.9 | 83.1 | 79.8 | 75.4 | 82.4 |
| 75.2 | 76.2 | 79.7 | 80.8 | 76.6 | 75.4 | 83.0 |
| 81.3 | 87.9 | 74.0 | 82.2 | 81.2 | 94.6 | 79.1 |
| 80.0 | 63.6 | 95.5 | 88.3 | 85.1 | 91.5 | 97.4 |
| Slightly wavy | Slightly wavy | Slightly wavy | Wavy | Curly | Curly | Wavy |
| Nearly absent | Slight | Moderate | Nil | Slight | Moderate | Nil |
| Horizontal | Slightly oblique | Horizontal | Horizontal | Slightly oblique | Slightly oblique | Horizontal |
| Slight | Absent | Absent | Slight | Marked | Absent | Very slight |
| Straight, broad, tip depressed | Straight, tip depressed | Straight, broad | Straight, broad, turned up | Concave, turned-up | Straight, flat, tip depressed | Straight, short, broad, turned up |
| Medium | Marked | Slight | Medium | Nearly absent | Medium | Medium |
| Medium | Rather thin | Thin | Medium | Medium | Medium | Medium |
| Absent | Absent | Absent | Slight | Slight | Medium | Medium |
| Pointed | .. | Round | Round | Round | Round, prominent | Round, retreating |
| Shield | Long oval | Elliptic | Shield | Long oval | Long oval | Long oval |
| Medium | Marked | Slight | Slight | Slight | Marked | Slight |

| Number | .. | .. | 13 | 14 | 15 | 16 | 17 |
|----------------------------|----|----|--------------------------------|---|--------------------------------------|---------------------------------|---------------------------|
| Sex | .. | .. | M. | M. | M. | M. | M. |
| Age | .. | .. | 25 | 17 | 25 | 20 | 20 |
| Name | .. | .. | Ni-it | Galúk | Yók-gading | Ansorr | Bu-suk |
| Height of Stature | .. | .. | 1,431 | 1,412 | 1,542 | 1,500 | 1,463 |
| Girth of Chest | .. | .. | 801 | 762 | 831 | 823 | 831 |
| Vertex to Tragus | .. | .. | 128 | 135 | 139 | 137 | 130 |
| Length of Head | .. | .. | 183 | 184 | 189 | 189 | 177 |
| Breadth of Head | .. | .. | 146 | 137 | 139 | 141 | 140 |
| Length of Face | .. | .. | 101 | 99 | 115 | 114 | 116 |
| Breadth of Face | .. | .. | 134 | 127 | 136 | 141 | 133 |
| Bigonial Breadth | .. | .. | 117 | 117 | 117 | 126 | 113 |
| Length of Nose | .. | .. | 41 | 43 | 49 | 49 | 48 |
| Breadth of Nose | .. | .. | 41 | 40 | 43 | 42 | 36 |
| Interocular Breadth | .. | .. | 35 | 33 | 37 | 42 | 31 |
| Cephalic Index | .. | .. | 79.7 | 74.4 | 73.5 | 74.6 | 79.1 |
| Cephalic Height Index | .. | .. | 70.0 | 73.3 | 74.3 | 72.5 | 73.4 |
| Facial Index | .. | .. | 75.3 | 78.0 | 82.7 | 80.8 | 87.2 |
| Nasal Index | .. | .. | 100.0 | 93.0 | 87.7 | 85.7 | 75.0 |
| Hair Character | .. | .. | Wavy | Curly | .. | Curly | Curly |
| Hair on Face | .. | .. | Slight | Slight | Absent | Slight | Slight |
| Eye Plane | .. | .. | Oblique | Oblique | Oblique | Oblique | Oblique |
| Epicanthus | .. | .. | Slight | Absent | Absent | Slight | Marked |
| Nose | .. | .. | Very broad, concave, turned up | Straight, broad, turned up, tip depressed | Short, broad, concave, tip depressed | Slightly concave, tip flattened | Straight, flat, turned up |
| Nasal Bridge | .. | .. | Nearly Absent | Slight | Medium | Slight | Slight |
| Lips | .. | .. | Medium | Thick | Thick | Rather thick | Rather thick |
| Prognathism | .. | .. | Slight | Slight labial | Medium | Slight labial | Slight labial |
| Chin | .. | .. | Square, prominent | Round, prominent | Round, prominent | Pointed, prominent | Pointed, retreating |
| Shape of Face | .. | .. | Shield | Long oval | Shield | Elliptic | Shield |
| Prominence of Cheek-bones. | .. | .. | Medium | Slight | Medium | Slight | Slight |

| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|--------------------------------------|-----------------------------|-----------------------------------|--|---------------------------------|--------------------------------------|---------------|
| F. | M. | M. | M. | M. | M. | F. |
| 20 | 35 | 18 | 40 | 25 | 15 | 25 |
| Kin-Manang | Pa Jelpuk | Yök-bün | Pa Loi-un | Bi-Kädehk | Yök-ton | Han-Kuis |
| 1,478 | 1,491 | 1,514 | 1,452 | 1,450 | 1,432 | 1,360 |
| .. | 840 | 762 | 780 | 813 | 760 | .. |
| 134 | 134 | 148 | 140 | 140 | 137 | 130 |
| 169 | 182 | 178 | 177 | 183 | 180 | 168 |
| 139 | 145 | 143 | 138 | 142 | 143 | 140 |
| 108 | 108 | 107 | 111 | 115 | 100 | 90 |
| 126 | 136 | 132 | 127 | 132 | 129 | 121 |
| 105 | 127 | 117 | 103 | 108 | 112 | 102 |
| 44 | 48 | 47 | 47 | 44 | 39 | 41.5 |
| 38 | 47 | 39 | 41 | 38 | 37 | 32 |
| 32 | 31 | 34 | 33 | 31.5 | 34 | 29 |
| 82.2 | 79.4 | 80.3 | 77.9 | 77.5 | 79.4 | 83.3 |
| 79.3 | 73.6 | 83.1 | 79.1 | 76.5 | 76.1 | 77.3 |
| 85.7 | 79.4 | 81.0 | 87.4 | 87.1 | 77.5 | 74.4 |
| 85.9 | 97.9 | 82.9 | 87.2 | 86.3 | 94.8 | 77.1 |
| Curly | Frizzy | Curly | Curly | Curly | Curly | Rather curly |
| Nil | Slight | Nil | Slight | Slight | Slight | Nil |
| Oblique | Slightly oblique | Rather oblique | Rather oblique | Rather oblique | Horizontal | Oblique |
| Marked | Absent | Marked | Absent | Slight | Marked | Slight |
| Straight, flat, broad, tip depressed | Slightly sinuous, turned up | Straight, short, broad, turned up | Straight, short, tip flattened and depressed | Convex, short, broad, turned up | Short, broad, concave, tip flattened | Concave |
| Slight | Medium | Slight | Slight | Slight | Nearly absent | Slight |
| Rather thick | Medium | Medium | Medium | Rather thick | Medium | Rather thick |
| Absent | Slight | Absent | Slight labial | Slight | Absent | Slight |
| Round, prominent | Round | Round | Square, retreating | Square | Pointed | .. |
| Long-oval | Shield | Shield | Shield | Shield | Long oval | Shield |
| Slight | Medium | Slight | Rather marked | Medium | Medium | Rather marked |

| Number | .. | .. | 25 | 26 | 27 | 28 | 29 |
|----------------------------|----|----|-----------------------|-------------------------------------|-------------------------------|---|-----------------|
| Sex | .. | .. | M. | M. | M. | F. | F. |
| Age | .. | .. | 30 | (?) | 25 | 25 | 40 |
| Name | .. | .. | Yök-sêngoi | Ba-serrlok | Yök-teluk | Kin-eurk | Kin-blünk |
| Height of Stature | .. | .. | 1,482 | 1,557 | 1,415 | 1,350 | 1,433 |
| Girth of Chest | .. | .. | 836 | 818 | 900 | .. | .. |
| Vertex to tragus | .. | .. | 128 | 134 | 140 | 125 | 138 |
| Length of Head | .. | .. | 185 | 180 | 183 | 155 | 184 |
| Breadth of Head | .. | .. | 146 | 137 | 139 | 130 | 133 |
| Length of Face | .. | .. | 111 | 111 | 100 | 96 | 105 |
| Breadth of Face | .. | .. | 134 | 136 | 136 | 121 | 124 |
| Bigonial breadth | .. | .. | 124 | 117 | 120 | 108 | 98 |
| Length of Nose | .. | .. | 47 | 41 | 40 | 45 | 44 |
| Breadth of Nose | .. | .. | 41 | 38 | 39 | 39 | 39 |
| Interocular Breadth | .. | .. | 35 | 30 | 34 | 32 | 37 |
| Cephalic Index | .. | .. | 78.9 | 76.1 | 75.9 | 83.9 | 72.2 |
| Cephalic Height Index | .. | .. | 69.2 | 74.4 | 76.5 | 80.6 | 75.0 |
| Facial Index | .. | .. | 82.8 | 81.6 | 73.5 | 79.3 | 84.6 |
| Nasal Index | .. | .. | 87.2 | 92.6 | 97.5 | 86.6 | 86.3 |
| Hair Character | .. | .. | Frizzy | Curly | Curly | Wavy | Wavy |
| Hair on Face | .. | .. | Slight | Slight | Slight | Nil | Nil |
| Eye Plane | .. | .. | Slightly oblique | Horizontal | Oblique | Horizontal | Horizontal |
| Epicanthus | .. | .. | Absent | Absent | Absent | Absent | Absent |
| Nose | .. | .. | Convex, tip flattened | Straight, broad, tip very depressed | Short, broad, slightly convex | Straight, flat, short, broad, tip depressed | Straight, broad |
| Nasal Bridge | .. | .. | Ratherslight | .. | Ratherslight | Slight | Very slight |
| Lips | .. | .. | Rather thick | Medium | Rather thick | Rather thick | Medium |
| Prognathism | .. | .. | Slight labial | Slight | Slight | Absent | Slight |
| Chin | .. | .. | Pointed | Prominent | Pointed | Round | Pointed |
| Shape of Face | .. | .. | Shield | Shield | Shield | Shield | Shield |
| Prominence of Cheek-bones. | .. | .. | Medium | Marked | Medium | Medium | Rather marked |

| 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|------------------------------|--|-------------------|------------------|-----------------------------|-----------------------------|--------------------------------|
| M. | M. | M. | M. | M. | F | M |
| 40 | 35 | 35 | 30 | 18 | 35 | 35 |
| Pa Raga | Penghulu Dalam | Tapong (Penghulu) | Pa Win | Sari | Jërr-nas | Eu-böl |
| 1,470 | 1,560 | 1,698 | 1,651 | 1,610 | 1,465 | 1,503 |
| 798 | 826 | 880 | 834 | 783 | .. | 835 |
| 129 | 134 | 147 | 145 | 137 | 137 | 134 |
| 187 | 187 | 192 | 194 | 185 | 176 | 183 |
| 145 | 133 | 145 | 148 | 144 | 137 | 147 |
| 107 | 114 | 115 | 114.5 | 119 | 99 | 122.5 |
| 134 | 126 | 140 | 138 | 123 | 128 | 138 |
| 98 | 117 | 117 | 114 | 119 | 104 | 120 |
| 46 | 47 | 46.5 | 49 | 47 | 38 | 53 |
| 43 | 44 | 39 | 38 | 39 | 39 | 42 |
| 31 | 34 | 34 | 32 | 33 | 31 | 31 |
| 77.5 | 71.1 | 75.5 | 76.2 | 77.8 | 74.4 | 80.3 |
| 69.0 | 71.6 | 76.5 | 74.7 | 74.0 | 77.8 | 79.7 |
| 79.8 | 90.4 | 82.1 | 83.0 | 96.7 | 77.3 | 88.7 |
| 93.4 | 93.6 | 83.8 | 77.5 | 82.0 | 97.4 | 70.2 |
| Curly | Wavy | Woolly | Curly | Woolly | Curly | Curly |
| Moderate | Slight | Slight | Slight | Slight | Nil | Slight |
| Horizontal | Slightly oblique | Horizontal | Slightly oblique | Slightly oblique | Slightly oblique | Horizontal |
| Absent | Marked | Slight | Slight | Marked | Very slight | Absent |
| Straight, flat, short, broad | Straight, broad, tip flattened and depressed | Straight | Straight | Short, broad, tip flattened | Short, broad, tip depressed | Convex, tip slightly depressed |
| Slight | Rather slight | Medium | Medium | Nearly absent | Slight | Marked |
| Rather thin | Rather thin | Rather thick | Medium | Medium | Rather thick | Medium |
| Slight | Absent | Slight labial | Slight | Slight labial | Slight labial | Slight |
| Round prominent | .. | Pointed | .. | .. | Pointed, retreating | Pointed |
| Shield | Shield | Shield | Long oval | Shield | Shield | Shield |
| Medium | Medium | Medium | Medium | Medium | Medium | Medium |

| Number | .. | .. | 37 | 38 | 39 | 40 | 41 |
|----------------------------|----|----|--------------------------|------------------------------------|--|------------------------------------|---------------------------------|
| Sex | .. | .. | M. | M. | M. | M. | M. |
| Age | .. | .. | 30 | 17 | 17 | 40 | 40 |
| Name | .. | .. | Putong | Chen-tol | Aiap | Penghulu Kërrdih | Penghulu Yök-nam |
| Height of Stature | .. | .. | 1,551 | 1,449 | 1,461 | 1,506 | 1,545 |
| Girth of Chest | .. | .. | 765 | 736 | 872 | 801 | 804 |
| Vertex to Tragus | .. | .. | 126 | 130 | 132 | 129 | 132 |
| Length of Head | .. | .. | 176 | 178.5 | 181 | 177 | 179 |
| Breadth of Head | .. | .. | 149 | 147 | 147 | 149 | 152 |
| Length of Face | .. | .. | 108 | 102 | 110.5 | 110 | 113 |
| Breadth of Face | .. | .. | 139 | 137 | 138 | 140 | 140 |
| Bigonial Breadth | .. | .. | 121 | 120 | 124 | 114 | 118 |
| Length of Nose | .. | .. | 45.5 | 41 | 40 | 46 | 42.5 |
| Breadth of Nose | .. | .. | 40 | 39 | 40 | 40 | 39 |
| Interocular Breadth | .. | .. | 35 | 36 | 35 | 32 | 32 |
| Cephalic Index | .. | .. | 84.6 | 82.3 | 81.3 | 84.1 | 84.9 |
| Cephalic Height Index | .. | .. | 71.5 | 78.4 | 72.9 | 72.9 | 73.7 |
| Facial Index | .. | .. | 77.7 | 74.4 | 88.3 | 78.5 | 80.7 |
| Nasal Index | .. | .. | 87.9 | 95.1 | 100.0 | 87.0 | 91.7 |
| Hair Character | .. | .. | Curly | Curly | Wavy | Curly | Wavy |
| Hair on Face | .. | .. | Slight | Slight | Slight | Moderate | Plentiful |
| Eye Plane | .. | .. | Oblique | Oblique | Horizontal | Horizontal | Horizontal |
| Epicanthus | .. | .. | Very slight | Very slight | Very slight | Absent | Absent |
| Nose | .. | .. | Straight, flat, broad | Straight, flat, short, broad | Straight, flat, short, broad, tip depressed | Straight, flat, short, broad | Straight, flat, turned up |
| Nasal Bridge | .. | .. | Slight | Nearly absent | Very slight | Slight | Slight |
| Lips | .. | .. | Thick | Rather thick | Rather thick | Medium | Medium |
| Prognathism | .. | .. | Slight labial | Slight labial | Slight labial | Absent | Slight labial |
| Chin | .. | .. | .. | Pointed, retreating | Pointed | Round, prominent | Round |
| Shape of Face | .. | .. | Shield | Shield | Shield | Oblong | Oblong |
| Prominence of Cheek-bones. | | | Medium | Medium | Medium | Medium | Medium |

| 42 | 43 | 44 | 45 | 46 | 47 | 48 |
|---------------------|--|---------------------------------------|--------------|-------------------|-----------------------|---------------|
| M. | M. | M. | M. | M. | M. | M. |
| 17 | 35 | 18 | 22 | 35 | 18 | 16 |
| Yök-ampeh | Yök-pa | Nur-seh | Yök-pang | Sün | Yök-bawok | Teh-bang |
| 1,532 | 1,488 | 1,552 | 1,527 | 1,561 | 1,555 | 1,490 |
| 750 | 806 | 833 | 820 | 816 | 789 | 741 |
| 134 | 136 | 135 | 130 | 130 | 134 | 136 |
| 176 | 181 | 184 | 180 | 188 | 186 | 186 |
| 150 | 143 | 148 | 149 | 147 | 151 | 143 |
| 105 | 111.5 | 100 | 113 | 117 | 104 | 106 |
| 133 | 136 | 132 | 138 | 133 | 140 | 138 |
| 111 | 125 | 115 | 121 | 115 | 125 | 125 |
| 41 | 41.5 | 39.5 | 45 | 53 | 48 | 43.5 |
| 35 | 43.5 | 41 | 40 | 41 | 41 | 41 |
| 32 | 53 | 32 | 35 | 35 | 36 | 36 |
| 85.2 | 81.2 | 77.1 | 82.7 | 72.8 | 81.1 | 76.8 |
| 76.1 | 75.1 | 73.3 | 72.2 | 69.1 | 72.0 | 73.1 |
| 78.9 | 81.2 | 75.7 | 81.8 | 87.9 | 74.3 | 76.7 |
| 85.3 | 95.4 | 96.3 | 88.8 | 77.3 | 85.4 | 94.2 |
| Wavy | Frizzy | Curly | Curly | Frizzy | Curly | Curly |
| Nil | Moderate | Nil | Slight | Moderate | Nil | Nil |
| Horizontal | Horizontal | Oblique | Horizontal | Horizontal | Slightly oblique | Oblique |
| Slight | Absent | Slight | Marked | Slight | Absent | Marked |
| Straight, turned up | Straight, flat, broad, tip flattened and depressed | Slightly convex, broad, tip depressed | Straight | Straight | Straight, flat, broad | Short broad |
| Slight | Very slight | Medium | Medium | Medium | Very slight | Slight |
| Rather thick | Medium | Thick | Rather thick | Thick | Rather thick | Thick |
| Slight labial | Slight labial | Slight labial | Slight | Slight | Slight labial | Slight labial |
| Round | .. | Pointed | Round | Round, retreating | Pointed, retreating | Very pointed |
| Shield | Long oval | Oblong shield | Shield | Shield | Shield | Oblong shield |
| Medium | Medium | Medium | Marked | Marked | Medium | Medium |

| | | | | | | | |
|---------------------------|----|----|---|-----------------------|------------|--------------------|---|
| Number | .. | .. | 49 | 50 | 51 | 52 | 53 |
| Sex | .. | .. | M. | F. | F. | F. | M. |
| Age | .. | .. | 17 | 20 | 40 | .. | 35 |
| Name | .. | .. | Yök-pangai | Indah | Leh-nap | Gitan | Buasuk |
| Height of Stature | .. | .. | 1,380 | 1,148 | 1,400 | 1,400 | 1,601 |
| Girth of Chest | .. | .. | .. | .. | .. | .. | 889 |
| Vertex to tragus | .. | .. | 125 | 135 | 132 | 130 | 134.5 |
| Length of Head | .. | .. | 173 | 176 | 178 | 177 | 199 |
| Breadth of Head | .. | .. | 136 | 137 | 143 | 141 | 150 |
| Length of Face | .. | .. | 107 | 106 | 94 | 102 | 112 |
| Breadth of Face | .. | .. | 125 | 125 | 120 | 132 | 145 |
| Bigonial breadth | .. | .. | 107 | 99 | 105 | 118 | 121 |
| Length of Nose | .. | .. | 46 | 42.5 | 43 | 41 | 44 |
| Breadth of Nose | .. | .. | 39 | 40 | 33.5 | 39 | 43.5 |
| Interocular Breadth | .. | .. | 30 | 37 | 31 | 37 | 36 |
| Cephalic Index | .. | .. | 78.5 | 77.8 | 83.4 | 79.6 | 75.3 |
| Cephalic Height Index | .. | .. | 72.6 | 76.7 | 74.1 | 76.7 | 67.6 |
| Facial Index | .. | .. | 85.6 | 84.8 | 78.3 | 77.2 | 77.2 |
| Nasal Index | .. | .. | 84.7 | 94.1 | 77.9 | 95.1 | 98.8 |
| Hair Character | .. | .. | Wavy | Curly | Wavy | Wavy | Curly |
| Hair on Face | .. | .. | Slight | Nil | Nil | Nil | Slight |
| Eye Plane | .. | .. | Horizontal | Horizontal | Horizontal | Horizontal | Slightly oblique |
| Epicanthus | .. | .. | Marked | Marked | Absent | Slight | Absent |
| Nose | .. | .. | Straight, broad, tip slightly flattened | Short, broad, concave | Straight | Concave, turned-up | Short, broad straight, tip slightly depressed |
| Nasal Bridge | .. | .. | Slight | Nearly absent | Medium | Slight | Medium |
| Lips | .. | .. | Thick | Rather thick | Medium | Rather thick | Thick |
| Prognathism | .. | .. | Medium | Absent | Absent | Absent | Absent |
| Chin | .. | .. | .. | Pointed | Round | Pointed | Round |
| Shape of Face | .. | .. | Shield | Long oval | Long oval | Short oval | Oblong shield |
| Prominence of Cheek-bones | .. | .. | Medium | Rather marked | Medium | Medium | Medium |

NOTE.

The tribe whose measurements are recorded in the foregoing pages have also been measured by Messrs. Annandale and Robinson, whose figures are given in detail in "Fasciculi Malayenses, Anthropology," Part I, pp. 105-149 (1903). As the measurements have been taken, which one exception, in precisely the same manner the results obtained are here given for comparative purposes, while in the third column both series have been combined, the number of observations, viz., 78, representing a very appreciable fraction of the total adult males of the tribe.

It will be noted that in those measurements that admit of a high degree of accuracy such as the length and breadth of the head and the length and breadth of the face, the two series show very close approximation, while in others, such as the height of the head from vertex to tragus, which are more difficult measurements to take, a considerable amount of divergence is exhibited.

The difference of bigonial breadths is due to the fact that in one instance an attempt was made to give the bony breadth of the face and in the other the fleshy breadth was recorded.

H C P

EXTREMES AND MEANS OF TWO SERIES OF MEASUREMENTS OF SENOI FROM THE
BATANG PADANG DISTRICT, SOUTH PERAK.

| | KLOSS | | | | ANNANDALE & ROBINSON | | | | COMBINED SERIES. | | | |
|-----------------------|-----------------------------|---------|--------|--------|------------------------------|----------|------|---------|----------------------------|----------|--------|---------|
| | No of Observ- ations. | Highest | Mean | Lowest | No. of Observ- ations. | Highest. | Mean | Lowest. | No of Observ- ations | Highest. | Mean. | Lowest. |
| Height of Stature | ... | 1,698 | 1516.2 | 1,380 | 34 | 1,638 | 1524 | 1,411 | 78 | 1,698 | 1519.5 | 1,380 |
| Girth of Chest | ... | 900 | 803.8 | 736 | 26 | 920 | 814 | 745 | 69 | 920 | 808.5 | 736 |
| Vertex to Tragus | ... | 148 | 134.9 | 125 | 34 | 141 | 127 | 110 | 78 | 148 | 131.5 | 110 |
| Length of Head | ... | 199 | 182.0 | 172 | 34 | 193 | 183 | 170 | 78 | 199 | 182.4 | 170 |
| Breadth of Head | ... | 152 | 143.5 | 133 | 34 | 151 | 142 | 130 | 78 | 152 | 142.7 | 130 |
| Length of Face | ... | 124 | 109.4 | 97 | 34 | 119 | 107 | 95 | 78 | 124 | 108.4 | 95 |
| Breadth of Face | ... | 145 | 134.0 | 123 | 34 | 147 | 135 | 125 | 78 | 147 | 134.4 | 123 |
| Bigonial Breadth | ... | 127 | 116.6 | 98 | 34 | 136 | 125 | 110 | 78 | 136 | 120.3 | 98 |
| Length of Nose | ... | 55 | 45.6 | 39 | 33 | 50.7 | 43.7 | 37.5 | 77 | 55 | 44.6 | 37.5 |
| Breadth of Nose | ... | 49 | 40.5 | 35 | 33 | 46 | 40.0 | 36.3 | 77 | 46 | 40.3 | 35 |
| Interocular Breadth | ... | 42 | 33.5 | 30 | 34 | 42 | 33 | 26 | 78 | 42 | 33.3 | 26 |
| Cephalic Index | ... | 85.2 | 78.7 | 71.1 | 34 | 82.6 | 78.3 | 73.4 | 78 | 85.2 | 78.5 | 71.1 |
| Cephalic Height Index | ... | 83.1 | 74.5 | 67.6 | 34 | 78.1 | 70.4 | 60.5 | 78 | 83.1 | 72.7 | 60.5 |
| Facial Index | ... | 96.7 | 81.9 | 73.5 | 34 | 88.2 | 79.3 | 73.1 | 78 | 96.7 | 81.7 | 73.1 |
| Nasal Index | ... | 105.0 | 88.8 | 63.6 | 33 | 111.8 | 91.9 | 79.0 | 77 | 111.8 | 90.2 | 63.6 |

X. NOTES ON THE SAKAI
OF THE ULU SUNGKAI IN THE BATANG
PADANG DISTRICT OF PERAK. (Pls. XXIV—XXVIII.)

By IVOR H. N. EVANS, *Assistant Curator*
and *Ethnographical Assistant F.M.S. Museums.*

In April, 1914, I paid a visit of about a fortnight's duration to Jeram Kawan, a rapid in the Sungkai river about eight or nine miles by boat from Sungkai village. A Malay settlement had recently been made on the bank of the river just below the rapid, the clearings at the time of my visit being only about three or four months old. Close by on the opposite bank was a single Sakai house standing in a considerable clearing which was planted with Indian corn, and it was from the inhabitants of this house that I obtained a good deal of the information embodied in the present paper. I took up my quarters in the hut of an old Malay named Hassan, who was employed by a Sungkai Chinaman to barter goods with the Sakai in exchange for rattans, and I was thus enabled to get into touch with aborigines from many up-country settlements, who came in to dispose of heavy bundles of cane. About a quarter of an hour's walk from the Malay clearing, and on the same side of the river, is a hot spring, the waters of which are strongly impregnated with sulphur, and to this, in dry weather, big game, chiefly seladang and deer, come in numbers to lick up the sulphur deposit. I mention the spring as I shall have occasion to refer to it later in connection with a Sakai folk-tale.

The Central Sakai of Batang Padang have been more measured and described than any other tribe in the Peninsula, and I therefore thought it better, with the exception of taking some photographs, to devote myself as much as possible to finding out what I could of Sakai folk-lore and beliefs.

Before turning to other subjects I should like to say a word of warning against accepting aborigines who may live in a certain district as necessarily truly belonging to it. The amount of shuffling and re-shuffling among aboriginal tribes has often been extraordinarily complex. Some of the various causes which have contributed to this admixture of tribes, and even of races in the Malay Peninsula are: pressure of alien populations (Malays, Siamese, Chinese, etc.), slave raiding expeditions by Malays before the country came under British control, especially by Sumatran Malays, Rawa and Mendiling people, in Selangor, Negri Sembilan, and Pahang; the escape or liberation of slaves who had been sold into another country, and on regaining their freedom reverted to jungle living, often forming small villages of their own, and taking wives from among the aborigines of the country: and the wandering habits

of certain tribes, notably in Pahang, who undertake long journeys in search of jungle produce or for other reasons.

All the up-country people who came down to Jeram Kawan seemed to be typical Senoi (Central Sakai), the purest tribe of Sakai in the Peninsula. They had the somewhat long and lean type of face with an often almost delicate nose, the straight eyes without any trace of the Mongolian fold, and the long wavy hair so characteristic of the true Sakai. On the other hand, of the three males in the house at Jeram Kawan, two presented features which led me at once to suspect the presence of Negrito blood, though their skin colour was scarcely darker than that of many of the up-country Sakai. (pl. XXIV) These two individuals were brothers and the faces of both were of the round and rather childish type so commonly seen among the Pangan and Semang, which contrasts very strongly with the long, serious-looking face of the pure Sakai type. On making further enquiries they told me that their father had been a Mai Pahang (Pahang man), and that he had come from somewhere in the Lipis district. As it is well known that there are a few wandering families of Pangan in this neighbourhood it is extremely likely that their father was a negrito.

Besides the settlement at Jeram Kawan there is another aboriginal village, Ungkun. (pl. XXIV) on the river between that place and Sungkai. Here again the community is decidedly mixed, the villagers being the descendants of slaves, aborigines of Selangor, who were sold into Perak by Rawa and Mendiling raiders, and on gaining their liberty formed alliances with Senoi women and settled down comparatively close to the Malay villages.

I brought two boys from this kampong back with me to Taiping, and on talking about the different Sakai settlements with them, they informed me that they could scarcely understand the people of the up-country villages at all, while though they understood, pretty well, the dialect talked by the people of the Jeram Kawan settlement, they (the J. K. Sakai) occasionally used words which they did not know; so apparently the dialect of the Sungkai settlement is a sort of bastard Senoi-Sakai. The Jeram Kawan people, from whom, as remarked above, I obtained much of my information, are evidently more akin in language and customs to the true Senoi than the people of the down-stream settlement.

GENERAL REMARKS ON THE SUNGKAI ABORIGINES.—(Pls. XXV—XXVII).

All the aborigines I met with called themselves Senoi and though they recognised the term Mai Darat * they said that it

* If this is so it is rather extraordinary as Mai is a Sakai word meaning people. Possibly the truth is that some other section of the Central Sakai use the term as their tribal name.

was applied to them by the Malays. The general appearance, habitations, dress, manufactures, and mode of life of the Senoi have been so frequently described that I think it unnecessary to record at length any observations on these matters, unless I believe them to be new or at variance with the accounts of other observers.

Face painting was seen on several of the women, the pigment being obtained from charcoal, or the face was marked with saliva coloured by sreh chewing.

Tattooing was observed on only three individuals. One of these had a design over the right breast, which apparently was meant to represent some kind of animal, but he informed me that it had been done by a Chinaman. Of the other two, one had a series of vertical lines tattooed on the forehead, and the other a single line reaching from the top of the forehead to the tip of the nose. Both these men told me that tattooing had been known to their ancestors for many generations and they further got for me some thorns of the "rotan dudok," the implements with which they said the colouring matter, charcoal, was pricked in. I handled the heads of both my informants, so, in addition to the information they gave me there was no possibility of my mistaking face painting for tattooing. In the case of the man with the single line down the nose, a good deal of colouring matter seemed to have been forced in, as the skin over the markings was slightly raised above the level of the adjacent parts. Several of the men who came from up-country had the septum of the nose bored for a nose stick, (Pl. XXVI) and ear-boring for the insertion of small Malay-pattern ear-studs or large bamboo ear-plugs was universal among the women. Unfinished cigarette ends were often carried in these holes in the ear-hole, or were placed behind the ear. Both men and women have the front teeth in the upper and lower jaws filed down. With regard to the blow-pipes of the Sungkai people, a long and short variety were seen, and long and short darts were used in them accordingly. The measurement for a long dart is from the point of the elbow to the tip of the little finger, and for a short one from the point of the elbow to the wrist. Two types of dart quiver were seen, one with a large, hard, round and almost flat cover of finely shredded and closely woven rattan cane, the other with the soft bag-like cover of plaited pandanus leaf, which is typical of the Central Sakai. I was told that the rattan covers were made by the men, and those of pandanus by the women.

The only clothing worn by most of the men from up-country was a simple T bandage of terap bark-cloth, which was often so small that it did not suffice to properly cover the genitals. Remarks on the scantiness of the loin-cloth among the Central-Sakai have however already been made in the "Fasciculi Malayenses" of Messrs. Annandale and Robinson. All the Senoi I met were able to talk fluent Malay, though some of them spoke with a harsh and jerky intonation.

SENOI NAMES.

Names are, I believe, generally given by the midwife. The prefix Yok before a name signifies a man, and Han a woman. When a married couple have had a child they are frequently not called by their own names, but are simply known as father (*Bek*) or mother (*Ken*) of so-and-so. Several examples of this will be found in the attached list of names of some of the Sakai I met at Jeram Kawan. The custom is common throughout Malaysia.

Males.

- | | |
|--------------------------------------|-------------------------------------|
| (1) Yok Simbok. | (7) Yok Integ. |
| (2) Yok Dalam. | (8) Yok Angong. |
| (3) Yok Pataling (or Bek Landas). | (9) Yok Batiwou (or Bek Sunyap.) |
| (4) Yok Tangkop. | (10) Yok Gok (or Bek Kidai.) |
| (5) Yok Jahaia. | (11) Yok Intan. |
| (6) Yok Sagop. | |

Females.

- | | |
|-------------------------------|----------|
| Han Gamak (or Ken Landas.) | Han Un. |
| Han Landas. | Han Yok. |

FOLK STORIES, RELIGION, AND SUPERSTITIONS.

The following folk stories were obtained from Yok Pataling, one of the Senoi of Jeram Kawan. They were told in a very disjointed fashion, important details being often omitted at first, and only coming to light after considerable questioning. I have however tried in translating to preserve the narrator's words as nearly as possible.

THE ORANG MENSUD.

The Senoi used to be attacked by a race of men called *Mai Mensud** (Mensud men) who came from Pahang. These had hair all over their bodies, arms, and legs. They used to come into people's houses and after feeding there (as guests,) seize some of the inhabitants in their arms, as they were squatting round the fire, and fly off with them to the mountains. After travelling for some time they used to come to a great marsh called Paya Lekut (The sticky marsh: lekut=Malay lekat.) Here they told their prisoners to sit down and rest, and when they did so, they seized them and threw them into the middle of the swamp. As soon as the prisoners had sunk into the marsh there arose from its surface spears, parangs (working knives,) adze heads, and blow-pipes. These the Orang Mensud collected and took home with them. If the Orang Mensud seized children they sold them as slaves. Sometimes a Mensud man used to take a *Halak* (magician) with him and go to a cave. They placed a little *Kijart*† near

* The Mensud and Temir rivers on which they were said to live were stated to be tributaries of the Bertang river in the Ulu Jelai district of Pahang.

† A kind of damar gum.

the mouth of the cave, and a snake came out of the hole, smelt the *Kijar*, and then went back again. After this dollars and beads appeared from out of the cave. These they gathered up, and then went home.

I was told that one man named Bek Jawil, who was still alive, had been seized by the "Orang Mensud" about three years ago, but had managed to make his escape.

LEGENDS OF THE ECLIPSE OF THE MOON.

I was fortunate enough to obtain two legends which differ considerably in details, but which both profess to account for the lunar eclipse: they were told to me by Yok Pataling, and are as follows:—

LEGEND I.

When the moon is quenched it falls to the earth. Presently a *Halak* (magician),—always the same man,—comes to the place where the moon has fallen to the earth and asks; "What are you doing there?" The Moon replies:—"I have fallen down. I came down to get food for my children the stars. If you don't help me to get back again to the sky all you men upon the earth will die." "Wait," says the *Halak*, and, as it is night, he goes to sleep. While he is asleep his familiar spirit (*Anak Yang*) comes to him and says, "Help the moon to get back or all men will die." "How can I help the moon to get back," says the *Halak*; "I cannot do it." "Get ready a *bumbun*" (a round hut made of large leaves), says the *Anak Yang*. So the *Halak* calls together his people and they prepare the *bumbun* and make music with bamboo stampers (*berchetog*: Malay, *berchentong*) and go through magical rites (*berjualak*) there for seven days and seven nights, calling on the *Anak Yang* to help them to get the moon back to the sky. At the end of this time the *Anak Yang* puts the moon back again.

— LEGEND II.

The sun is angry with the moon because of an old quarrel. Formerly both the sun and the moon had many children, but the moon said to the sun, "Men cannot stand the heat of your children. If you will eat your children, I will eat mine." So the sun ate his children, but the moon hid hers (the stars) and afterwards producing them refused to carry out her part of the bargain. So that is why the sun is angry with the moon and fights her whenever they meet.

When an eclipse occurs I was told that the Senoi call out

O Rahu* perjuk gecek jik!
Jik mong kulit dunia!

*c. f. Ulu Bertang Sakais' beliefs. Skeat's Pagan Races Vol. II, p. 235 According to Thompson (Lotus Land p. 130) Pra Rahgo is the Siamese deity who tries to swallow the moon and sun, thus causing solar or lunar eclipses.

See also Wilkinson's Malay Dictionary "rahu."

which means

O sky, give me back my moon!

I am still upon the crust of the world!

The Senoi are very much afraid of thunder and lightning, and certain actions which are thought to bring about bad storms are tabu. If a person offends against one of these tabus it is considered necessary to take precautions to avoid the evil consequences of the infringement, otherwise the house of the transgressor will be struck by lightning and everyone in it killed. The tabus of this kind which I collected are given below.

It is tabu to—

- (1) take a jungle leech off the body and put it into the fire.
- (2) put *malau* (a kind of gum) into the fire.
- (3) tease a cat or dog in the house.
- (4) tease a tame monkey or dress it up like a man and laugh at its antics.

If a child breaks the tabus relating to cats, dogs, or monkeys and a storm comes up soon after, its mother cuts off some hair from its head, wraps it up in a piece of thatch and, going out of the house, places the parcel of hair on the ground and strikes it with a parang or a billet of wood. Up-country Senoi were also said to cut a piece of hair from a friend's head, place it on the ground and strike it with a parang, whenever a thunder storm overtook them in the jungle.

The hot springs near Jeram Kawan are thought to have arisen owing to the infraction of a storm tabu by some Sakai many generations ago, and the Senoi told me the following legend about them.

THE LEGEND OF THE HOT SPRINGS.

Long ago a man who had three wives, all sisters, lived on the present site of the hot springs. He was a *Halak*. One day he shot a brok monkey* with his blowpipe and was just going to roast it when his father-in-law came to his house and seeing the monkey said "If you want to keep my daughters with you and are really a *Halak* don't roast that monkey but bring it to life again." For a long time the *Halak* refused but as his father-in-law insisted on it he at last went and pulled the poisoned dart out of the monkey and drew the poison out of the wound with his fingers. Then the monkey came to life again, and they dressed him in coat and trousers and gave him a sword, and he danced (*bersilat*) on the ground outside the house.

After a time the *Halak* wanted to stop the monkey dancing and said to his father-in-law, "that is enough," but his father-in-law, who was much amused, told him to let it con-

* *Macaca nemestrina*.

tinue. After the performance had gone on for some time, the father-in-law, two of the *Halak*'s wives, and the people who had come together to see the sport, all laughing at the monkey, the *Halak* got ready his carrying basket and going into his house to the wife of whom he was fondest, and who had not gone outside to see the monkey dance, or laughed at it, he rubbed her between his hands, and she became a pebble, which he put into his carrying basket. Then he lay down on his mat as if he were going to sleep. When his father-in-law, his two wives and the rest of the people stopped laughing at the monkey, there immediately arose a great thunder-storm, and as soon as this began the *Halak*, taking his basket, came down from the house, and went off into the jungle, leaving his other two wives, his father-in-law and the rest of the people behind him. Thereupon his house was struck by lightning and his father-in-law and the people who had come to watch the monkey were all killed. As for the *Halak* he fought the lightning (*chilou*) stabbing at it with his spear while his familiar spirit (*Anak Yang*) helped him by biting at it. At last the *Halak* finding that he could not win the fight, ran off into the jungle and escaped. The two wives whom the *Halak* had left behind at the house were not struck by lightning and ran away to Bukit Ubai Baleh (The Maiden's Hill.) Here they saw something which looked like a big tree-root, but which was really a dragon, so, plucking some *bertam* fruits, they put them on the "root" and cut them open with a parang. When they had done this they were immediately drawn in under the "root" (the dragon's body) and died. The dragon has now become a stone and can still be seen on the side of the hill, and the two wives' dresses of leaves also became smaller stones, and lie near the dragon's body.

The Senoi have many charms and incantations for stopping or warding off thunder-storms. Those I was able to collect are given below.

(i) To try and stop a storm which has already begun, a man will call out

Gar ingar, eng sengoh.
Don't thunder (?) I am frightened.

(ii) For the same purpose

Poie sur! Chongkajok!
Chongburbur!
Sur kinjok nor laut!
Go wind! Creepers and Rattans! Go clouds to the sea!

(iii) For the same purpose

Brou gek-gek-gek!
S'lak berjut!
S'lak n'rik!
Srek asut!
Stop a little!

Leaves of the *berjut*! (a kind of creeper).
 Leaves of the *chapa*! (*Blumea balsamifera*).
 Stop (?) altogether! (*asut* means dry).

(iv) For the same purpose

Lors pateh-ge!
 Go back there! (The Malay, *Balik ka' sana*).

After repeating this the face is turned towards the direction from which the storm comes, the right hand is put in front of the mouth, trumpet fashion, and blown through "Puah," the hand, almost at the same moment, being sharply moved away from the mouth in a horizontal direction for a couple of feet and the fingers opened. This may also be done after repeating any other of the charms.

(v) To be used when thunder is heard coming up in the distance.

Garoh, Garoh, Garoh! (supposed to represent the sound of thunder).
 Sa'hari ini kamaru!
 Sa'hari esok pek jadi!

Which means

Let the weather be hot to-day
 and don't let it rain to-morrow.
 (Literally—To-day hot weather. To-morrow don't let it become (rainy).

This charm is of course almost entirely in the Malay language, the only Sakai word being *pek*. A somewhat different version was given as well and I reproduce it here though I could not get its full meaning.

(vi) Garoh, Garoh, Garoh.

Makoh menrit pek jadi.
 (*Makoh* was said to mean pregnant).

(vii) Used when the sound of coming rain is heard by people on a journey in the jungle.

Orang sini gulai kaladi.
 Orang sana gulai tapah.
 Orang sini jangan jadi.
 Orang sana biar basah.

This charm again is entirely Malay and means

The people here eat curried kaladi.
 The people there eat curried tapah (a kind of fish).
 Don't let it rain on the people here.
 It does not matter if the people over there get wet.

According to the Senoi, when there comes a shower followed by sunshine, the rainbow springs up from a place where a tiger has been sick.

VARIOUS BELIEFS AND TABUS.

Most of the following tabus are I believe not in force among the people of the settlement near Sungkai, and are less rigidly adhered to at Jeram Kawan than among the up-country Senoi.

(i) Women and children may not eat, cook, or touch deer's flesh, or go near the body of a dead deer.*

(ii) They are also prohibited from eating the flesh of the following animals.

The Sēladang (*Bos gaurus*)

The Brok Monkey (*Macaca nemestrina*)

The Krah Monkey (*Macaca fascicularis*)

The Menturun Raya or Benturong (*Arctictis binturong*)

(iii) The flesh of elephants may not be eaten by the Senoi of Sungkai under any circumstances. It was said that anyone who broke the tabu would fall ill and die.

(iv) Some people consider it tabu to tell their own names.

(v) It is tabu to strike a parang (working knife) into an old tree stump in a clearing and leave it sticking there. This action would disturb the earth spirit and cause plagues of rats or insects.

(vi) If a man drops a piece of food and says "Peninah," which is a curse, he considers that the food is tabu to him and will not pick it up and eat it. To do so would be to court dysentery.

The existence of one rather interesting tabu, which I believe is also kept by local Malays, I found out in the following way. Yok Dalam, the headman of the Jeram Kawan people, had the misfortune to fall from a tree and bruise himself very badly. It appears that a message was sent to the settlement near Sungkai asking that any women who were skilled in medicine should come to Jeram Kawan to treat him. On the day after the accident I was sitting outside the hut in which I was staying, when three Sakai women and two youths went by, evidently on their way to Jeram Kawan, walking quickly in single file. As I was acquainted with two of the party I called out and asked them if they were going to treat Yok Dalam, but was rather surprised to get no answer. On thinking for a minute I concluded that there was probably a tabu against speaking binding on persons going to treat a sick man, and on subsequent enquiry I found my surmise to be correct.

Another rather curious little observance came to light owing to the same accident. One of the Sakai, after telling me how Yok Dalam had fallen down, said that his companions

* The infringement of any of these tabus is said to bring convulsions on the head of the guilty party.

had made a bed of leaves for him so that he might rest until he had recovered a little, and had then taken repeated strides backwards and forwards over his body. Asked why this was done my informant said that he did not know, except that it was customary to do so when a man fell from a tree, and that the action was supposed to help the patient to recover.

The reason of Yok Dalam's misfortune was thought to have been because he left the house without chewing *sireh*, as he had wanted to do, but being in a hurry had put it off. On account of this he was said to have been stricken by "*Punan*" (*kena Punan*), it being considered particularly unlucky to go out into the jungle with any craving unsatisfied. This belief according to Hassan is also current among the local Malays. There is a Malay word *Kempunan* meaning "a dilemma or difficulty caused by every course open to one having its disastrous features" (Wilkinson's Dictionary), which very probably has some relation to the *punan* of the Sakai.

RELIGION.

The Sakai seem to have very few definite religious beliefs, but they have a supreme God, *Yenang*, whom they say corresponds to the *Tuhan Allah* of the Malays. The following legend gives some details about *Yenang* and the Sakai after-life, though I am inclined to think that the greater part of it may have been borrowed from the Malays, and slightly adapted to suit Sakai ideas.

"The souls of *Senoi* leave their bodies, before they actually die, by the whorl of hair at the back of the head (*ruai*.) The soul passes to the west and tries to get into heaven (*Surga*, Malay) by the gate, by which the souls of Malays enter. This it cannot do, so it goes round by another way until it comes to a large iron cauldron (*kawah*) full of hot water. This is spanned by a bridge called *Menteg* (meaning unknown to Yok Pataling, who told me the story) which looks like a tree trunk from which the bark has been removed. Below the iron cauldron there is a great fire. The souls of little children pass safely over the bridge for they are without fault, but those of full grown people fall into the cauldron of hot water. *Yenang* takes these souls from the cauldron and plunges them into the fire until they are reduced to powder. Then he weighs them in a pair of scales and if they weigh lightly he passes them over into heaven, but if they are heavy he puts them into the fire again until they are sufficiently purified.

BURIAL CUSTOMS.

I had no opportunity of visiting any Sakai graves, but I made a good many enquiries about burial customs, and about the haunting of the grave by evil spirits. The results of my questioning are as follows.

The body of a dead person is buried lying on the left side with the head towards the west and the face looking north.

To make a grave a rectangular pit is dug to a depth of a man's breast and a cave-like excavation sufficient to contain the body is then made in one side of it. The corpse, which is wrapped in mats, is put into this, and the mouth of it closed up by driving stakes into the bottom of the pit and stretching a sheet of tree bark between the stakes and the mouth of the burial niche. The hole is then filled in and the deceased's belongings and food and tobacco placed on the top of the grave.

[This information was obtained from Yok Pataling, but one of the youths of the Ungkun settlement, whom I brought to Taiping, afterwards contradicted the statements about the position in burial saying that the corpse was put on its back with its head pointing to the east. Possibly different customs may prevail among the Ungkun people.]

For the first five days after burial, food is placed on the grave every day, and for six days numbers of evil spirits are thought to collect at the grave of the deceased and feast. During that period children are not allowed to go out after dark.

The following information, obtained from Yok Pataling, is somewhat "jumbled" but I found it impossible to obtain a clearer account.

An evil spirit in the appearance of the dead person, (apparently not the actual soul or spirit of the deceased) haunts the grave. It has its face turned backwards on its body and its eyes are rolled upwards till only the whites are visible. When an evil spirit of this kind catches hold of a human being the part touched withers. If a *Halak* dreams that there is an evil spirit at a grave, his *Anak Yang* coming to him in the dream and telling him, he goes to the grave with his *Anak Yang* and hiding behind a tree watches the evil spirit feasting with the companions he has called together. Now the evil spirit's companions are chiefly spirits whom the *Halak* has already conquered and who are afraid of him. After watching for a time the *Halak* and his *Anak Yang* rush out and the latter seizes the spirit while the *Halak* stabs it with a bamboo spear. When the *Halak* stabs the spirit the other ghosts all vanish, being frightened of the *Halak*, and immediately the mouth of the grave opens and the spirit jumps into it, pursued by the *Halak* and the *Anak Yang*. The spirit runs away into the earth. The *Halak* and the *Anak Yang* go to the corpse, and the *Halak* strokes its face to see that all is well. Then the bottom of the grave opens below them and they find their way to heaven (*Surga*), passing over the bridge called *Menteg*. After this the *Halak* returns to earth by some unknown road. When he has got back to the earth he makes a medicine hut (*bumbun*) and decorates it with sweet smelling flowers, *lebak* leaves and long bamboo water-vessels decorated with patterns and full of water. When night comes he performs magical rites (*bejualak*) and in the early morning the

spirit whom he wounded comes outside and hurls the spear with which he was stabbed through the wall of the *bumbun*. The *Halak* seizes the spear and then goes to sleep and whatever offerings the spirit asks of him in his dreams such as *bras kunyet*,* or soaked rice in the husk, he throws out of the hut into the jungle. The spirit takes the *bras kunyet* and the soaked rice (*bertis*) and throws back a few grains as a sign that he wishes to be friendly with the *Halak*. So after this the spirit becomes the *Halak*'s friend and helps him to cure sick people and in other ways.

THE HALAK.

I obtained the following further details about *Halaks* and their attributes, which I may as well give here.

(i) The *Halak* is said not to be buried in the earth. Instead of this his body is placed in a round hut (*bumbun*) and left there. Two or three days after death the body vanishes from the hut.

(ii) The spirit of a dead *Halak* becomes a *B'lian* or were-tiger.

(iii) The last of the great *Halaks* in the Sungkai district, a man named Bekoh, is said to have died about five years ago. Since then, though there are several men who are supposed to have a little knowledge, there has been no one to succeed him. Old Hassan, the Malay, declared that he had seen Bekoh, when possessed, grow a large pair of canine teeth (*taring*) three or four inches long. These on Bekoh's command he had taken hold and shaken in order to prove that they were genuine. Jahaia, headman of the settlement between Jeram Kawan and Sungkai, makes some pretence to being a *Halak* and is supposed to have a familiar spirit which descended to him from his father, but he can scarcely be counted a Senoi, as his father was a Malay-speaking Selangor aborigine and his mother I believe half Senoi half "Mai Selangor." I will however describe a performance seen at Jahaia's kampong later on.

SENOI OATHS.

If a Sakai wishes to take an oath he swears by the sun. This I found out in the following manner. While I was at Sungkai a dog of Yok Pataling's chased and slightly bit a goat belonging to a Malay. This was, the Malay thought, too good a chance of imposing on a Sakai to be let slip, so he started "dunning" Yok Pataling for seven dollars cash as compensation, or demanded in lieu thereof that he should come and work for him for several days. Hassan, the rattan gatherer, told me about the affair and I called Yok Pataling and asked him if the goat was badly damaged. He replied, that the wound was little more than a scratch. "Very well," I said, "you go and tell this Malay that if he considers he has

* Rice coloured with turmeric

any claim on you for damage to his goat he is to come and see me about it." Yok Pataling went off at once and gave the Malay my message, whereupon the latter immediately changed his tone and said that he had only been joking and that Yok Pataling did not owe him anything, at the same time upbraiding him very bitterly for having gone and informed the "Tuan." To this Yok Pataling replied "I swear by the sun that I did not tell the "Tuan," and if I lie, may the sun shrivel up my tongue."

BIRTH CUSTOMS.

My informants with regard to birth customs were two Jeram Kawan Sakai. The information obtained from them is given below.

The expectant mother is isolated in a small hut of leaves built on the ground not far from her own house, it being tabu for a birth to take place in an ordinary dwelling. Here she is attended by the midwife, and after the child has been born she goes through a three days purification ceremony in the hut, bathing under a decorated bamboo spout into which water is poured from a long water bamboo. When the purification is over the mother returns to her own house and the midwife ceases attendance. No fish or chilies may be eaten by a woman for two months after she has given birth to a child, and salt and the cabbages of all palm trees which have thorny stems are forbidden for several days. The midwife must be present and eat with a woman when she takes fish or flesh with her rice (*makan berlauk*) for the first time after her delivery. A similar heating treatment to that employed by the Malays, is undergone by Sakai women after their confinement.

HALAK'S PERFORMANCE AT UNGKUN.*

While stopping at Jeram Kawan I arranged with Jahaia, the headman of the down-stream settlement, Ungkun, to hold a magical performance on the night of May 26th. I left Jeram Kawan by boat at about 3 p.m. and arrived at Jahaia's kampong, where I was to sleep that night, some time before dark. Here I found the women busy cutting up and plaiting leaves which were to form the ceremonial decorations and getting ready the bamboo stampers with which an accompaniment is played to the *Halak's* chants. Jahaia was becomingly modest and said that he would do his best though he could not claim to be a proper *Halak*, and only knew how to perform a little. Some time after dark the sound of the bamboo stampers from a neighbouring house announced that the performance was about to begin. Making my way to this, and up the tall ladder, I found the hut crowded by the inhabitants of the whole settlement, who were engaged in chattering, sireh chewing, and slapping their bodies in order to

* See photo Pl. XXVIII taken outside the house on the morning after the performance.

obtain some relief from the swarms of sandflies which infested the village. The *Halak's* apparatus consisted of a circular frame of rattan cane, with a diameter of about four feet, hung all round with a fringe of *bertam* leaves cut into strips about 3 ft. long. This frame was suspended at a distance of about 4 ft. from the floor, the ends of the hangings thus being about 6 ins. from it. The frame was held in position by three strips of tree-bark, which were attached to it at regular intervals, and were all tied together to a roof beam of the house. Close to the frame, and about 5 ft. above it, was hung one of the ceremonial offering trays (*anchak*) which are used both by Malays and aborigines. This was decorated with ceremonial hangings of cut and plaited leaves and the scented inner bark of some tree. At the side of the hut was tied a sheaf of the large leaves of the *salak* palm (*Zalacca edulis*). Jahaia reserved his exhibition till late in the evening and the first performer was a youth who I was given to understand did not possess a familiar spirit, but hoped possibly to cultivate one in time. He wore a loin cloth round his waist and on his head a wreath of shredded leaves, studded with flowers, which had a sort of ornamental brush of stiff leaves standing up from it at the back. Two garlands of cut leaves on a foundation of tree-bark were worn crossed over his chest and in his hand he carried a switch of *lebak* leaves. He took up a squatting position on the floor within the circle of the hangings attached to the rattan frame, and another young man, wearing a wreath of flowers on his head, also entered the circle as his assistant. When the hut had been plunged into semi-darkness by tying up *salak* leaves in front of a lamp hung near the door, the women, with a bamboo stamper in either hand, took places behind a log of wood which had been placed near one side of the hut. The young *Halak* then commenced a chant in a Sakai dialect, each line being taken up and repeated by his assistant and an accompaniment played by the women with their stampers on the log of wood. Every time the *Halak* raised his voice he brought the switch of *lebak* leaves smartly down on the palm of his left and he also frequently flourished it over his right shoulder. The chant was, I understand, an invocation to an *Anak Yang* to come and obey his commands. Presently two or three other youths came and crouched under the circle of hanging leaves, those who could not get entirely inside it managing at any rate to squeeze in their heads and shoulders. After the performance had gone on for some time it was brought to a close, and Jahaia with a single assistant took his place within the circle. Jahaia, having inherited his familiar spirit from his father who, as mentioned above, was a Malay-speaking Selangor aborigine, proceeded to call upon it in Malay. His chant was taken up by his assistant and the women who were beating time with the stampers, and after a while a Sakai who was squatting next to me told me that the *Anak Yang* had come. Jahaia then stood up and grasping the circular rattan frame in his

hands told it to dip towards myself, which it immediately did,—not a very wonderful thing, as Jahaia had hold of it on each side of his body. After this I left the hut as it was 2 a.m. and I was told that the rest of the performance would be similar to that which had already taken place. I was unfortunately unable to catch sufficient of the chant to be able to write it down, but I heard “*mari ka' ujong jalan* (come to the end of the path) frequently repeated and from what I could make out of the rest it seemed to be a prayer to the *Anak Yang* to come to Jahaia. I have since been told by the two boys I brought home with me that there is another man in the village who has a better claim to be considered a *Halak* than Jahaia. He was able, they said, by the help of his familiar spirit,—and they had seen him themselves do it,—to split a large section of bamboo without touching it, and they described how his *Anak Yang* was heard to enter the bamboo with a noise like *crik-crik-crik*, the bamboo splitting into two pieces, with a loud report, a few minutes afterwards. He was also able to grow large eye-teeth, *taring*, out of the corners of his mouth, and between his first and second fingers. Yok Tong, the elder of the two boys, told me that the *Halak* had once caught hold of his head with the teeth between his fingers. Another of his accomplishments was to turn himself into a tiger,—he had been seen to do this by Yok Tong's sister,—and to go off into the jungle in search of game. Perhaps I may be able to return to Sungkai at some future date and investigate these remarkable performances for myself. I had heard before at Jeram Kawan that Sakai *Halaks* were able to split open bamboos as described, but it would be worth while to see if a *Halak* can be got to undertake to do it for a suitable reward.

XI. NOTES ON VARIOUS ABORIGINAL TRIBES OF NEGRI SEMBILAN (Plates XXIX—XXX).

By IVOR H. N. EVANS, *B.A.*, Assistant Curator and
Ethnographical Assistant I.M.S. Museums.

These notes were made during a Museum expedition to Negri Sembilan at the beginning of 1914. Aborigines were found at the following places, Pertang in the State of Jekebu, Bahau on the railway line to Pahang, and Kelapi, an aboriginal village about two miles from Kampong Inas. The trip did not yield any objects of great ethnographical interest, but this was only to be expected, since none of these people are now distinguishable in dress and belongings from the local Malays. From only one of the tribes visited was a vocabulary other than Malay obtained, namely, from a few Serting River aborigines seen at Bahau, whose speech was essentially similar to that of the mixed peoples of S. Pahang. The most interesting result of the expedition was some information with regard to certain beliefs about the shamanistic practices of the Serting tribe, and a little information concerning the appeasing of the evil spirits of the jungle, got both from the Serting and the Pertang groups.

THE JAKUNS* OF TITI RAMEI, PERTANG (Pl. XXIX).

Thanks to the kindness of Mr. T. R. Hubback, of Pertang the writer was enabled to spend a few days in this locality, and to get into touch with sections of two tribes of aborigines. One of these small parties had a couple of huts in a clearing close to the place where the Pertang River crosses the Ayer Bening bridle path, the spot where their houses were situated being called Titi Ramei (Populous bridge). Two visits were paid to these people, and in addition some of them came up twice to Mr. Hubback's bungalow. They are a Malay speaking tribe, but they seem to use a few non-Malayan words, and their speech is rather a rude dialect. To the Malays they are known as Sakai (a term applied to most aboriginal tribes) Berenyup or Renyup, the latter apparently because of their constantly using the expression "*nyup*," (there is not, *tid'ada*), but the name they apply to themselves, is Orang Lapan (men of the plains). Their houses resemble those of the poorer class of Malay peasants, as do also their household utensils and their clothes. At the time of our visit a number of the people were away in the jungle at some durian groves, there

* For the sake of convenience throughout these papers the aborigines are referred to as Jakuns, for though there may be some small admixture of Sakai blood in them, and one tribe speaks a Sakai dialect, their physical characteristics are those of Proto-Malays.

being only four fully grown men left at home. These were all brothers, and sons of a very old woman, who said that she had thirteen children, of whom six males and two females still survived. The clearing in which the houses stood was planted with tapioca and keladi, but neither of these were sufficiently advanced to be used as food. Until the crop ripened the Jakuns were living by cutting rattans in the jungle and selling them to the Chinese storekeepers at Pertang, supplementing the rice which they were thus enabled to purchase with whatever animals they could shoot with their blow pipes. The four brothers mentioned above all possessed titles, being respectively Batin, Mentri, Toh Kampong and Penghulu. The following list of tribal officers was given, and they were said to have precedence as enumerated. If this information is correct, and the natives insisted that it was, the order is distinctly unusual: since the Batin, Jinang and Jukrah are the chief officers among most southern tribes.

- (1) Batin.
- (2) Penghulu dalam.
- (3) Toh Kampong.
- (4) Mentri.
- (5) Jukrah.
- (6) Jinang.

According to these Jakuns' own account their place of origin was the Klau River * and there are said to be more of the tribe at Jeram.†

PERSONAL APPEARANCE AND CHARACTER.

Of the four adult males seen, three were distinctly handsome and well built, especially the youngest of them, Bongsu. The fourth man, who was suffering from a bad foot, and was covered with *kurap* (*Tinea circinata*), so that he had not a very prepossessing appearance. One of the younger women who had given birth to a male child the night before the writer's first visit, was also good-looking. She seemed to be suffering very little from her recent trials and insisted on coming to the door of the hut to be photographed, although she was told to keep quiet inside. The hair of all the people was either straight or very slightly wavy, while their skin colour was as light as that of the local Malays. Though accused by the Malays of being lazy, a failing from which the latter are not unknown themselves to suffer, they seemed to be a pleasant, well mannered, and contented people.

WEAPONS.

The blow-pipe is of the usual Negri Sembilan type and calls for no special remark. The outer tube is decorated with incised patterns reaching from above the mouth-piece to the

* A tributary of the Semantan River, Pahang.

† On the Bentong River, not far from the Klau

node, separating the two internodes of bamboo of which the outer case is formed. The quivers seen, with one exception, were without covers of any kind, the Jakuns saying that they were too lazy to make them. In the one complete specimen, the sides of the cover were made of plaited rattan and the top of a piece of wood, flat above, but with a conical projection on the under surface, which fitted into a space in the centre of the quiver, inside the dart holders. The darts were short, as is generally the case in Negri Sembilan. The poison for the dart points was said to be made of *getah ipoh* obtained from the Kayas tree (*Antiaris toxicaria*) and from *akar tengah* (?), a kind of liana.

OBJECTS COLLECTED.

As remarked above the tribes visited proved to have few objects of interest to a collector and the only specimens obtained at Titi Ramei were a single blow-pipe, a quiver without a cover, two snares of fine cord made from the bark of the *Terap* tree (*Artocarpus Kunstleri*), a *chapeng* (little girls' fig leaf) made from a piece of a tortoise shell and a bamboo flute with three stops. The nose flute is not used.

FIRE MAKING.

The only method of making fire which the Pertang people know, other than by cheap matches purchased at the Chinese shops, is by flint and steel. One man said that he had once tried to make fire with a rattan saw and a piece of soft wood, but had been unsuccessful.

RELIGION AND SUPERSTITIONS.

The Pertang aborigines seem to have no belief in any supreme Deity of their own, though they know of the Malays' *Tuhan Allah*. They are, however, much afraid of what they call *Punan*, which seems to be a personification of all the ills which may befall them in the jungle. Before starting on a journey it is necessary to burn incense to *Punan* and the man who cooks for the rest of the party in the jungle must also burn a little incense each time he prepares food; while if a stranger passes when cooking is going on he must take a little rice or water from the pot and call *Punan* to partake of the offering that he is making, at the same time smearing the rice or water on the back of his neck or on his left forearm. If *Punan* is not appeased, some calamity is sure to happen, the person or persons who have failed to make the customary offerings, will suffer from fever, or swellings in the groin, or will be bitten by snakes or centipedes. It is said that *Punan* stabs those who have offended him (and thus causes their illness).

The *semangat padi* or rice soul is said to be taken where hill padi is planted, an old woman going into the crop before reaping commences and cutting seven ears. Three days after

the taking of the *semangat* general reaping may be begun. The *semangat* is hung up in the house in a basket and is finally mixed with the seed padi for the next crop.

It is tabu for the Pertang people to mention the name of either father or mother. On being questioned as to the reason for this they replied "*kita takut mati, kena daulat ayah,*"—we are afraid of dying through being struck by the indwelling power (*daulat*) * of our father.

There is no Pawang or Bomor (magician or doctor) at Titi Ramei and in cases of sickness they call in the Batin of a tribe living at Durian Tawar, who is supposed to be skilled in magic.

CIRCUMCISION AND TOOTH FILING. *

Circumcision† is customary for males, though not compulsory, and many of the women undergo a corresponding operation. Bongsu, one of the four brothers mentioned above had not been circumcised, though he was about twenty years of age. He had a long lock of hair like the *jambul* of little Malay boys, which he rolled into a ball on the front of the head, but whether he wore this as a sign that the operation had not been performed, or merely as an ornament, the writer did not find out. Possibly the custom of circumcision has been adopted in imitation of the Malays.

Tooth filing is general.

MARRIAGE.

Apparently the people of Titi Ramei do not marry among themselves, the reason probably being that they are all closely related. They said they took wives either from the Durian Tawar tribe, or from another settlement at Durian Tipus.

LANGUAGE.

The only words, other than Malay, obtained from the Pertang Jakun were as follows:—

| | | | |
|-------------------------|-----|-----|-----------------|
| Gibbon (ungka) | ... | ... | Timok. |
| Kingfisher (pekakak) | ... | ... | Burong changah. |
| Millipede (sepak bulan) | ... | ... | Gelentu. |
| Blowpipe (sumpitan) | ... | ... | Temiang. |

* *Daulat* is the peculiar sacred power which invests Royalty, and which is also communicated to regalia. Formerly the belief in this divine power of kings or chiefs, which is a very widely spread one, was strong among the Maories of New Zealand, and in most of the Islands of Polynesia, where it was thought that if any commoner were to unwittingly offend against the royal tabu by using an article which belonged to a king or chief he would be stricken ill and die; there are several well authenticated cases of natives of Polynesia, who had' without knowing it, broken a royal tabu, having actually died of fright when informed of their crime. Deaths said to be due to violation of the sanctity of the regalia of Malay Sultans are not unknown in the Peninsula (vide "Malay Magic" p. 41).

† The word used for circumcision was *sunat* which is the usual word for the operation among the Malays, but possibly they may really practice incision which is found among many Jakun tribes.

| | | | |
|--------------|-------------------------------|--------|-----------------|
| Blowpipe | Mouthpiece (pangkal sumpitan) | ... .. | Tebong temiang. |
| Dart | Quiver (tabong bekas damak) | ... .. | Telak damak. |
| Quiver | cords (tali tabong) | ... .. | Tali telak. |
| Butt of dart | (pangkal damak) | ... .. | Pahabong damak. |
| Dart-holder | (sarong damak) | ... .. | Plet damak. |

THE JAKUNS OF DURIAN TAWAR, NEAR PERTANG. (Pl. xxix).

These people came down to Mr. Hubback's estate on being called by his Malay tracker Yassin. They were led by an old man who turned out to be a most unmitigated rascal, and the whole party, probably at his instigation, were loud in cadging for money. The old man, who was the Batin, appeared to have travelled a great deal and to have lived with the Besis in Selangor. A short vocabulary was obtained from him, which appeared to resemble greatly a Besis dialect; but this was left uncompleted, since it was intended to visit his settlement a couple of days later. However, on it being mentioned to the Titi Ramei people that the Durian Tawar aborigines spoke a Sakai (non-Malay) dialect they seemed surprised and said; "Well, we know all about the Durian Tawar people, as we frequently take wives from there, but we have never heard them speak anything but Malay, as we do." On talking the matter over further it became evident that the Durian Tawar Batin had deliberately given us Besis words, a knowledge of which language he had picked up on his travels, his idea probably being that the white man would be better pleased to hear that his people had a language of their own, than that they merely spoke Malay. The intended journey to Durian Tawar was not carried out in consequence of the unreliability of the Batin.

THE SERTING JAKUN. (Pl. XXX.)

The Serting people did not prove to be much more interesting than the aborigines seen at Pertang or Kelapi, except in so far as they were not a Malay-speaking tribe, but of course they were quite familiar with that language for purposes of conversation with outsiders. The few of them seen, made a very favourable impression on the writer, as did the people of Titi Ramei; their manners were good, and they did not clamour for presents or money as do so many of the tamer aborigines. Only one small settlement was visited, which was close to an estate at Bahau belonging to Mr. M. Hemmant, who very kindly put the writer up for a few nights, and did everything in his power to make the visit a success.

TRIBAL NAME.

The Serting people are called by the Malays either "Orang Bukit," a very general name for aboriginal tribes, or

Sakai Semlai (or Semleh). The latter name refers to their language, which, for some undiscoverable reason, is called Semlai. According to their own account they call themselves *Bekturk Chong*, which has exactly the same meaning as the Malay, *Orang Bukit*, i.e. Hill People.

TRIBAL OFFICERS.

The following are the names of tribal officers given in their correct order of precedence.

1. Batin.
2. Mentri or Jukrah.
3. Jinang.

On the death of the Batin the Jukrah usually replaces him, and the Jinang becomes Jukrah.

HABITATIONS.

The few houses seen were similar to those of the poorer local Malays, except that they lacked a cook house (*dapor*) and were not divided up into rooms. The house walls were made of the bark of the *kepong* tree and the floor was of bamboo laths. Cooking was done on an open hearth of dried mud. One house had the space between the floor and the ground fenced in to form a fold (*kandang*), for a few goats which the owner was rearing.

BLOW-PIPES, QUIVERS AND DART POISON.

The blow-pipe is similar to that of the Pertang people. The only dart-quiver seen was without a cover. Poison for blow-pipe darts was said to be composed of the juice of the *kayas* tree (*Antiaris toxicaria*) mixed with *akar ipoh* (probably some species of *strychnos*).

FIRE-MAKING.

The methods of making fire with a rattan saw and a block of soft wood, or with a drill and block were both known.

AGRICULTURE.

The houses of the Bahau settlement were situated in a fairly large clearing planted with *kaladi*, but *ubi kayu* (tapioca) and hill rice are also grown to a certain extent. According to the Jukrah, a clearing is only used for a year i.e., long enough to get a crop from it, and is then abandoned.

INTOXICANTS.

As among several of the tribes of Selangor and Negeri Sembilan, notably the Besisi, an intoxicating drink is brewed from the *tampoi* fruit. The liquor is not stored, but consumed as soon as ready for use. The *tampoi* season is the great time

for feasting, and the Serting people at the time of the writer's visit were feeling rather sorry for themselves because the *tampoi* trees had failed to fruit.

RELIGION AND SUPERSTITIONS.

The Serting people say that they believe in a Supreme Deity (*Tuhan Allah*) and that after death the good go to *Shurga* (Heaven), while the bad are condemned to suffer in *Neraka* (Hell), but these ideas have obviously been adopted from the surrounding Malays. Much more interesting were the beliefs connected with the *poYang's** methods of treating the sick. The Jakuns said that their *poYangs* often worked their spells for the recovery of the sick in a beehive hut of palm leaves† in the depths of the jungle, the interior of the hut being decorated with the long ceremonial hangings of plaited leaves which are known as *jari lipan* or centipedes toes. On being asked what was the use of the *jari lipan*, one old man replied that in his conjurations the *poYang* made use of a good spirit called the *Mambang* (not the same as the *Mambang* of the Malays, the personification of the sunset glow). "The *Mambang* lives on the hills and the shadows of the *jari lipan* within the *poYang's* hut stretch out to the hill tops and form a path for the *Mambang* to descend to the hut at the *poYang's* request. When the *Mambang* has come down into the hut the *poYang* tells him to go and look for the soul of the sick man. The *Mambang*, obeying the *poYang's* command, goes back to the hills by the road that he came, and when he reaches them journeys to the houses of the evil spirits who live on the hill-tops. Outside their houses are the souls (*semangat*) of many people hanging up in cages, and if he finds the soul for which he is looking the sick man recovers, but if the evil spirit has carried the soul into his house he is unable to release it and the sufferer dies."

According to the same old man, people fall ill because evil spirits lie in wait for them and strike their shadows with a club as they pass.

As among the Pertang Jakuns *Punan* is feared and propitiated. Water in which rice is cooking is taken from the pot and rubbed on the fore-arm, the man who is making this offering calling out "*Punan, Punan, Punan*," and at the same time stretching out the arm on which he has smeared the rice water.

The *semangat padi* is said to be taken occasionally when they have a rice crop.

The names of father or mother, father-in-law or mother-in-law must not be mentioned.

* The *poYang* among these southern tribes has the position of both the Malay *pawang*, magician, and the *bomov*, doctor.

† This procedure is similar to that of the Ulu Langat and Ulu Kenaboi *poYangs*.

BURIALS.

Graves are stated to be railed in with a trellis work fence (*pagar tingalong*). Deaths are an occasion for feasting, but it is said that no offering of food is placed on the grave.

MARRIAGE.

Marriages, which are celebrated with feasting, usually take place between members of the same tribe, but occasionally they are contracted with strangers. Second cousins (*dua pupu*) are prohibited from marrying, but marriages between third cousins (*tiga pupu*) are allowed.

CIRCUMCISION AND TOOTH FILING.

Both circumcision and tooth filing are general among the men.

VOCABULARY.

| English—Malay. | | Serting River Jakun (Bekturk Chong.) | |
|-----------------------|-----|---|--------------|
| Head—kepala | ... | ... | koie. |
| Ear—telinga | ... | ... | tung. |
| Eye—mata | ... | ... | mot. |
| Nose—hidong | ... | ... | muh. |
| Nostril—lubang hidong | ... | ... | liang muh. |
| Cheek—pipi | ... | ... | meng. |
| Mouth—mulut | ... | ... | M.* |
| Lip—bibir | ... | ... | M. |
| Tongue—lidah | ... | ... | lepes. |
| Tooth—gigi | ... | ... | lemoin. |
| Chin—dagu | ... | ... | M. |
| Throat—leher | ... | ... | lengek. |
| Neck—tengkok | ... | ... | baseng. |
| Shoulder—bahu | ... | ... | bahuk. |
| Arm—lengan | ... | ... | bleng. |
| Elbow—siku | ... | ... | chinchung. |
| Hand—tangan | ... | ... | ti. |
| Thumb—ibu tangan | ... | ... | gadut ti. |
| Finger—jari | ... | ... | jarek. |
| Finger-nail—kuku | ... | ... | cherus. |
| Thigh—paha | ... | ... | belu. |
| Knee—lutut | ... | ... | kaltong. |
| Shin—tulang kring | ... | ... | betis. |
| Foot—kaki | ... | ... | jong. |
| Heel—tumit | ... | ... | M. |
| Sole—tapak kaki | ... | .. | tampar jong. |
| Toe—jari kaki | ... | ... | jarek jong. |
| Breast—dada | ... | ... | M. |
| Back—bèlakang | ... | ... | cherolu. |
| Heart—jantung hati | ... | ... | jantung. |

* The letter M indicates that the word used is the same as the Malay.

| English—Malay. | Serting River Jakun (Be kturk Chong). |
|-------------------------------|--|
| Liver—hati | gris. |
| Stomach—perut | lepoit |
| Navel—pusat | M. |
| Intestines—isi perut | kung weit. |
| Blood—darah | maham. |
| Bone—tulang | je-arng. |
| Skin—kulit | M. |
| Hair—rambut | suk. |
| Old—tua | gedoh. |
| Young—muda | mudak. |
| Fat—gemok | M. |
| Thin—kurus | M. |
| Hot—panas | pret. |
| Cold—sejok | tekot. |
| Blind—buta | butak. |
| Deaf—tuli | M. |
| Dumb—bisu | M. |
| Fever—demam | trok. |
| Itch—kurap, kudis | M. |
| Vomit—muntah | kaku. |
| Gripes—sakit perut | ni lepoit. |
| Diarrhoea—cheret | jer-jaur. |
| Cough—batok | M. |
| Dead—mati | kebus. |
| Putrid—busok | see-it. |
| Father—bapa | apet. |
| Mother—ibu | M. |
| Husband—laki, suami | kenlug. |
| Wife—bini | kempun. |
| Male—jantan | remol. |
| Female—betina | kedol. |
| Man—orang laki-laki | kenlug. |
| Woman—orang perempuan | kedol. |
| Person—orang | berkturk. |
| Son—anak laki-laki | kenon remol. |
| Daughter—anak perempuan | kenon kedol. |
| Child—kanak-kanak | kenkon raket. |
| Boy—budak laki-laki | kenon remol. |
| Girl—budak perempuan | kenon kedol. |
| Maiden—anak dara | kedol darah. |
| Elder brother—abang | i-ek. |
| Elder sister—kakak | gah-u. |
| Younger brother—adek | M. |
| Younger sister—adek perempuan | adek kedol. |
| Elephant—gajah | M. |
| Rhinoceros—badak | M. |
| Tapir—tenok, badak tampong | M. |
| Gaur—seladang | M. |
| Bear—beruang | M. |
| Deer—rusa | jisuk. |

English—Malay.

Serting River Jakun
(Bekturk Chong).

| | |
|---------------------------------|------------------------|
| Chevrotin—napoh, pelandok | chee-ong, plandok. |
| Wild-pig—babi hutan ... | jalu. |
| Porcupine—landak ... | jēkos. |
| Dog—anjing | chor. |
| Wild dog—anjing serigalla | chor bri. |
| Tiger—harimau ... | pōdong. |
| Black panther—harimau kumbang | pōdong. |
| Wild cat—kuching hutan | kuching bri. |
| Cat—kuching ... | M. |
| Bear-cat—benturong ... | ? |
| Civet-cat—musang ... | M. |
| Large squirrel—tupai nandong | M. |
| Small squirrel—tupai kampong | M. |
| Flying lemur—kubong ... | M. |
| Loris—kongkang, kera duku | riu. |
| Bamboo-rat—dekan ... | M. |
| Rat—tikus ... | kanek. |
| Gibbon—ungka ... | tau. |
| Monkey—lotong ... | baseng. |
| „ kera ... | trau. |
| „ berok ... | kok. |
| Fruit-bat—keluang ... | M. |
| Bat—kelawar .. | semah, sentot. |
| Crocodile—buaya ... | kerbok. |
| Monitor-lizard—biawak | pari. |
| Grass-lizard—bengkarong | M. |
| Flying-lizard—chichak kubin | M. |
| Land-tortoise—kura-kura, baning | yeoh, (M). |
| Water-tortoise—labi-labi | M. |
| Snake—ular ... | tejoh. |
| Python—ular sawah ... | tejoh (no other name). |
| Frog—katak ... | M. |
| Fish—ikan ... | chereh. |
| Horn—tandok ... | M. |
| Tusk of elephant—gading | M. |
| Tail—ekur... .. | pas. |
| Hornbill—enggang ... | tekūup. |
| Hawk, eagle—lang ... | kalang. |
| Owl—burong hantu ... | chīm. |
| Egret—bangau ... | banghau. |
| Jungle-fowl—ayam denak | hayam. |
| Argus-pheasant—kuau, kuang | kaung. |
| Green pigeon—punai ... | M. |
| Crow—gagak ... | agak. |
| Kingfisher—pekakak, raja udang | M. |
| Woodpecker—pelatok ... | M. |
| Magpie-robin—murai ... | chītoi. |
| Egg—telur ... | kapoh. |
| Feather—bulu ayam ... | suk hayam. |
| Beak—paroh ... | chēnu. |

| English—Malay. | Serting River Jukon (Bekturk Chong). |
|------------------------------|---|
| Ant—semut ... | M. |
| Red ant—kerengga ... | M. |
| White ant—anai-anai ... | run. |
| Bee—lebah ... | ibu. |
| Honey—ayer madu ... | ? (manisan). |
| Wax—lilin ... | M. |
| Hornet—tebuan ... | hong. |
| Wasp—penyengat ... | kemut ket. |
| Fly—lalat ... | roic. |
| Black scorpion—kala ... | keleutam. |
| Small scorpion—kala jengking | pepesan. |
| Centipede—lipan ... | kai-ip. |
| Millipede—sepak bulan ... | kelui. |
| Cockroach—lipas ... | sebertek. |
| Spider—laba laba ... | kelekap. |
| Coconut-beetle—kumbang | M. |
| Mosquito—nyamok ... | semoin. |
| Tree—pokok kayu ... | delong. |
| Bough—dahan ... | roh. |
| Root—akar pokok ... | rēs. |
| Leaf—daun kayu ... | daun delong. |
| Flower—bunga ... | bekau. |
| Fruit—buah kayu ... | plē. |
| Fungus—chendawan ... | M. |
| Bamboo—buloh, aur ... | ding. |
| Rattan—akar ... | dreh. |
| Thorn—duri ... | jarlah. |
| Rice—padi ... | babah. |
| „ beras ... | beras. |
| „ nasi ... | hūit. |
| Banana—pisang ... | tīuk. |
| Areca-nut—pinang ... | M. |
| Durian—durian ... | M. |
| Tampoi—tempui ... | M. |
| Rambutan—rambutan ... | M. |
| Sireh-leaf—daun sireh ... | M. |
| Screw-palm—pandan, mengkuang | M. |
| Terap-tree—pohon kayu terap | delong meran. |
| Forest—hutan ... | bri. |
| Yam—ubi kayu ... | hubi. |
| „ keledek ... | M. |
| „ keladi ... | rebol. |
| To walk—berjalan ... | suak. |
| „ run—lari ... | paloh. |
| „ stand—berdiri ... | uh-ow. |
| „ sit—dudok ... | kem-kom. |
| „ lie down—berbaring | dem-dum. |
| „ sleep—tidur ... | jepek. |
| „ snore—berdengkur ... | bersenur. |
| „ jump—melompat ... | M. |

| English—Malay. | Serting River Jukun (Bekturk Chong). |
|----------------------------|---|
| To climb—memanjat ... | ... yaur. |
| „ hold—pegang ... | ... tenglong. |
| „ lift up—angkat ... | ... M. |
| „ throw—lempar, lontar ... | ... jah jok. |
| „ scratch—garu ... | ... gah-gish. |
| „ spit—ludah ... | ... tātoh. |
| „ bite—gigit ... | ... gingoin. |
| „ pinch—chubit ... | ... chet kīt. |
| „ wash—membasoh ... | ... M. |
| „ bathe—mandi ... | ... hūm. |
| „ cook—memasak ... | ... panchin. |
| „ eat—makan ... | ... chiar. |
| „ drink—minum ... | ... jāh-oh. |
| „ chew—mamah ... | ... M. |
| „ fly—terbang ... | ... pēr̄h. |
| Sun—matahari ... | ... M. |
| Moon—bulan ... | ... M. |
| Star—bintang ... | ... M. |
| Cloud—awan ... | ... M. |
| Mountain—gunong ... | ... chong. |
| Hill—bukit ... | ... chong. |
| Day—siang hari ... | ... siang tingi. |
| Night—malam ... | ... petoin. |
| Thunder—guroh, petir ... | ... M. |
| Wind—angin ... | ... M. |
| Rain—hujan ... | ... lesum. |
| Storm—ribut ... | ... M. |
| Fire—api ... | ... ūs. |
| Water—ayer ... | ... jah-oh. |
| Smoke—asap api ... | ... jek-turkūs. |
| One—satu ... | ... moie. |
| Two—dua ... | ... duah. |
| Three—tiga ... | ... 'mpe. |
| Four—empat ... | ... 'mpun (five=mesong) six=peruk. |
| Ashes—abu ... | ... habuk. |
| Salt—garam ... | ... M. |
| Tobacco—tembakau ... | ... M. |
| Stone—batu ... | ... M. |
| Earth—tanah ... | ... ateh. |
| A clearing—ladang ... | ... dehūh. |
| House—rumah, pondok ... | ... dol, pondong. |
| Roof—atap rumah ... | ... hatap. |
| Chopper—parang ... | ... waie. |
| Axe—kapak, beliong ... | ... M. |
| Knife—pisau ... | ... waie gos. |
| Cloth—kain ... | ... M. |
| Girdle—gendit, kendit ... | ... M. |
| Spear—lembing ... | ... lembeng. |
| Blowpipe—sumpitan ... | ... ding. |

| English—Malay. | Serting River Jakun (Bekturk Chong). |
|-----------------------------|---|
| Mouthpiece—pangkal sumpitan | ... delong ding. |
| Muzzle—mata sumpitan | ... soin ding. |
| Quiver—tabong bekas damak | ... lūk. |
| Quiver-cords—tali tabong | ... tali lūk. |
| Dart—damak | ... damak. |
| Point of dart—mata damak | ... cheh (poison) damak. |
| Butt of dart—pangkal damak | ... pahabong damak. |
| Dart-holder—sarong damak | ... blēt. |
| Poison—ipoh | ... cheh. |

THE JAKUN OF INAS. (Pl. xxx).

A short visit was paid to an aboriginal settlement named Kelapi which was situated rather more than a couple of miles from Kampong Inas, near Johol. The distance from Inas to the Jakun village was traversed on foot, the baggage being carried by a mixed crew of Malays and Jakuns along a rough mining road. When nearing Kelapi, a small party of Jakuns were encountered sitting under a tree by the wayside. These people volunteered the information that they were Catholics, and had come originally from the mission at Ayer Salak, about nine miles from Malacca. They had with them a little boy of about two years old who had a very light skin and looked distinctly Chinese. On being asked if the child was one of theirs, the oldest man of the party said that it was his grandson, his daughter having married a Chinese mechanic at Malacca. A few of these mission Jakuns were scattered about in several of the neighbouring aboriginal settlements, notable Charek and Miku. The name of Father Borie, the Founder of the Ayer Salak mission is still known among them, and Emi, the old man mentioned above said that he could remember him, though he was only a youngster when Father Borie left Malacca owing to ill health.* There were no Catholics in the settlement of Kelapi. All the Jakuns met near Inas were pleasant and well mannered people, though to an ethnographist they were not particularly interesting, since they had to a very large extent adopted Malay fashions.

HABITATIONS.

The houses of the Kelapi aborigines were similar to those of the Pertang and Serting Jakuns. The space between the flooring and the ground was fenced in to form a fold (kandang) for sheltering goats and fowls at night, and one of these folds contained a tame deer.

AGRICULTURE.

The kampong had quite extensive wet rice (*sawah*) fields, which were well protected by fences. Buffaloes, of which the

* He was said to have died on the voyage to Europe.

Jakuns had several had been turned loose among the stubble of last year's crop. A remark made with regard to these animals rather well illustrates the Jakuns' attachment to their old wandering habits. On one man being congratulated on the prosperous appearance of the village, and possession of goats, buffaloes and fowls, he replied, "Oh yes, it is very nice, but one day we shall get tired of it all, sell the whole lot, and move off somewhere else."

THE BLOW-PIPE.

The description already given of the blow-pipes of the Pertang and Seriting peoples applies equally well to those of the Inas Jakun. The only quiver seen had a conical wooden top to the cover, the sides being made of plaited rattan.

Blow-pipes are still used a good deal, though the Jakuns have some fearful and wonderful old muzzle loading guns of which they are extremely proud.

RELIGION AND SUPERSTITIONS.

The beliefs of the Pertang and Bahau people with regard to *Punan*, and the *Poyang's* use of the *Mambang* were confirmed by the people of Kelapi. In addition, a field tabu similar to one in force among the Besis of Selangor was obtained from them. It was said that in preparing ground for cultivation great care must be taken not to disturb the *Hantu Tanah* (earth spirit) or *Jembalang*. When once a clearing has been made, no tree stump or old branch must be struck with a parang, or the *Hantu Tanah* will be aroused and will appear in the form of rats or mice and destroy the crop.

The *semangat padi* (rice soul,) which by these people is called the *kepala padi* is said to be taken for both dry and hill rice.

The names of mother-in-law, father-in-law, mother or father should not be mentioned. A man is said to be *tenung* (afraid) to mention these forbidden names, or those of any of the fiercer kinds of animals found in the jungle.

XII. SOME SEMANG VOCABULARIES OBTAINED IN PAHANG AND PERAK

Vocabulary I—Pangan of Cheka, Cential Pahang

This vocabulary was taken by I. H. N. Evans, the tribe speaking it being described in No. 4, Vol. V. of this Journal.

Vocabulary II.—Semang of Ijok, Selama. North Perak.

Taken by H. C. Robinson and C. B. Kloss in April 1909: *vide* No. 4, Vol. V.

Vocabulary III.—Orang Bukit of Lenggong, Upper Perak.

Taken by H. C. Robinson and C. B. Kloss at Ijok, Selama, in 1909. The people are described by I. H. N. Evans, in No. 4, Vol. V.

Vocabulary IV.—Sakai Jhehri of Temengoh, Upper Perak.

The Sakai Jhehri appeared to us nearly pure Negritos and are fairly numerous in the neighbourhood of Temengoh, living in a state of absolute dependance, hardly to be distinguished from slavery, on the local Malays. We could see no characters which would differentiate them physically from the Semang of Ijok except that on the whole they are perhaps a somewhat taller and more robust race, perhaps less affected by *kurap*.

The vocabulary was taken at Temengoh on July 9th, 1909 and checked from a second member of the tribe a few days later. The ethnology and physical anthropology of the tribe have been dealt with by Dr. Annandale and one of us and photographs of the people reproduced [Fascic. Malay. Anthropology, Part I. pp. 27, 28, 112, 159-162 (1903)].

Vocabulary V—Sakai Tanjong or Sakai Jhehri Blukai of Temengoh.

This vocabulary was taken by H. C. Robinson and C. B. Kloss at Temengoh in July 1909 from a small tribe of six men, who visited that village. In complexion and skin they were very dark, almost chocolate, with very broad nose, prognathism was slight and the oldest man had a very wedge shaped face, was relatively very tall and had grizzled hair. One youth was very much yellower than the others, with more oval eyes, possibly indicating an admixture of Chinese blood. His colour was practically identical with that of the local Malay.

Vocabulary VI.—Sakai Tanjong or Semang Paya.

Elicited from a party of half a dozen men met at Grik Rest house by H. C. Robinson and C. B. Kloss. They appeared to be physically true Negritos and ranged from Betong in Rhaman to Lenggong west of the Perak River.

VOCABULARY—Continued.

| English—Malay. | Pangan of the Cheka River, Pahang. | Semang Paya of Ijok, Selama, Perak. | Sakai Bukit of Lenggong, Upper Perak. | Sakai Jehehr, Temengoh, Upper Perak. | Sakai Jehehr Blukar, Temengoh, Upper Perak. | Sakai Tanjung or Semang Paya, Kampong Padang, near Grik, Perak |
|----------------------|--|---|---|--|---|---|
| Thigh—paha | bleh | blöh | bleh | belut | belut | tahn |
| Knee—lutut | kaltong | kartong | kaiyol | kaltong | kaltong | kaiyol |
| Shin—tulang kering | langod | goh | kete | keting, gor | gor | ketek. |
| Foot—kaki | chan | chan | juk | chan | chan | joh. |
| Heel—tumit | dedul | deldol | deldol | deldol | deldol | tampai. |
| Sole—tapak kaki | tapak chan (k sound). | .. | kedal | dada chan | dada chan | .. |
| Toe—jari kaki | boh chan | wing chan | tabok | chan | tabok | tabok juk |
| Breast—dada | chénar | sóp | mem | dada | dada | dada. |
| Back—belakang | kerok | kiar | kiyok | kroh | kroh | piyók. |
| Heart—jantung hati | mangkol | langis | sób | klangis | k'langis | hüp. |
| Liver—hati | kelangis | yos | hüb | klap | rüs | yis |
| Stomach—perut | kud | chong | kud | et | et | kud. |
| Navel—pusat | see-eg | lus | panik | düt | düt | panih |
| Intestines—isi perut | ichung | et chong | eg chong | et chüing | bab | id kud |
| Blood—darah | maham | mahum | darah | darah | behum | daiyah |
| Bone—tulang | jee-ing | tulang | ja-ang | jehing | jing | jaak. |
| Skin—kulit | ketok | ketok | ka-teng | ketut | ketut | kalegn. |
| Hair—rambut | sog | sok | sintal kúu | sokui | sok koi, sed | sintok kui. |
| Old—tua | talü | bídog | bidog | kebit | kebib | lidog. |
| Young—muda | wcng-dah | anek | baleh (female) | krajuk | kejuk | litok. |
| Fat—gemok | bechok | munchal | chukek | seg (?) | boh | kaiyud. |
| Thin—kurus | jerengkong | tapang | kebed | hod | charib | kuyus. |
| Hot—panas | hüd | ka-on | boi | bekut | bekud | bud modis |
| Cold—sejuk | tonked | unveh | sejuk | kerkoh sijai | sejuk | lekad |
| Blind—buta | chok-med | hol | pan | chok | chung | pad man. |

VOCABULARY—Continued.

| English—Malay. | Pagan of the Cheka River, Pahang. | Semang Paya of Ijok, Selama, Perak. | Sakai Bukit of Lenggong, Upper Perak. | Sakai Jehehr, Temengoh, Upper Perak. | Sakai Jehehr Blukar, Temengoh, Upper Perak. | Sakai Tanjong, or Semang Paya, Kampong Padang, near Grik, Perak. |
|--|---|---|---|--|---|---|
| Son—anak laki-laki. Also to "son" and "boy," "daughter" and "girl." | wong tungkal | wing tungkal | k'ôn | wang | ken | kuhn. |
| Daughter—anak perempuan | wong kong | .. | m'êh | wang ken | mêh | .. |
| Child—kanak-kanak | wong kanid | .. | panoh | .. | .. | .. |
| Boy—budak laki-laki | ? wong tungkal | .. | .. | .. | .. | .. |
| Girl—budak perempuan | ? wong kong | .. | .. | .. | .. | .. |
| Maiden—anak dara | wong keradah | .. | .. | .. | .. | .. |
| Elder brother—abang | tok tungkal | wing ki-adah | k(e)toh | baloh | anek | baleh. |
| Elder sister—kakak | tok kong | oh | .. | pe(n) | pehr | kloh. |
| Younger brother—adek | bel tungkal | toh | poh | behr (?) | behr | pôh. |
| Younger sister—adek perempuan | bel kong | behr mabeh | .. | .. | .. | poh baloh. |
| Elephant—gajah | lëman | gajah | .. | gajah, iton | gajah | gajah |
| Rhinoceros—badak | bagap | argap | hagab | badak, bada | badak | badag. |
| Tapir—tenok, badak tampong | bai-id | bai-et | baian | barong, baret | baret | baivad |
| Gaur—seladang | sapi | sapi | sapi | .. | sapi | sapi. |
| Bear—beruang | seladang | kau yap | kaweb | kawep | kawep | klabaus. |
| Deer—rusa | tëlabas | soh | yusa | rusa, kasar | kasa | rusa. |
| Chevrotn—napoh, pelandok | kasar | pechep | pacheng | b'hol | plandok | .. |
| Wild-pig—babi hutan | pachug | kecheh, napeh | napag | bis | kawen | napag. |
| Porcupine—landak | badih | laneh | lantoss | lantak(k), lanek, | lanek | lanag. |
| Dog—anjing | baloie | ch | choh | achi | asoh | choh. |
| Wild-dog—anjing serigala | werh | cheling | chelong | chelong, asu | chelong | choh chelog. |
| Tiger—harimau | serangul | talok | kemeugn | jlok | ab | baling. |
| Black panther—harimau kumbang.. | talok | talok robong | chig chog | .. | chi-chok | baling berting. |
| Wild cat—kuching hutan | ? talok robong | go-ong | kimkung ai | museng, rubor | élong | kuching. |
| Cat—kuching | kuching | chepu (r) | .. | kuching | .. | .. |

VOCABULARY—Continued.

| English—Malay. | Pangan of the Cheka River, Pahang. | Semang Paya of Ijok Selama, Perak. | Sakai Bukit of Lenggong, Upper Perak. | Sakai Jehehr, Temengoh, Upper Perak. | Sakai Jehehr Blukar, Temengoh, Upper Perak. | Sakai Tanjong or Semang Paya, Kampong Padang, near Grik, Perak. |
|--------------------------------|--|--|---|--|---|--|
| Bear-cat—benturong | .. | menjong | manto | .. | lungan | .. |
| Civet cat—musang | .. | .. | manjong (n) | chik-choi | kenseng | musang. |
| Large squirrel—tupai | .. | mal | linguss | krelat, kedek | seko | kedeg. |
| kerewak. | .. | .. | .. | .. | .. | .. |
| Small squirrel—tupai kampong | .. | wai | kēdeg | cheri, seko | kedik rampoh | lingus. |
| Flying lemur—kubong | .. | pama | pama | kai-e | kai-i | pama. |
| Loris—kongkang, kera duku | .. | .. | .. | .. | chang oit | .. |
| Bambo-rat—dekan | .. | om | nehoi | .. | kai yum | li-ung. |
| Rat—tikus | .. | .. | .. | kai-yun | kedik | kedeg |
| Gibbon—ungka | .. | tawa | tawah | unging | tēku | tawa |
| Monkey—lotong | .. | masing | bassoh | rampoh | rampoh | biu. |
| —kera | .. | jaiyoh | jaiu | daong | baudat | basa. |
| —berok | .. | dawai | apong | bau-at | kawet | yai-ah, apong. |
| Fruit-bat—keluang | .. | kauyet | kawed | .. | resel | .. |
| Bat—kelawar | .. | plig | paleg | rasel | buaya | luya. |
| Crocodile—buaya | .. | byuway | buya | buya | bagen | pai-yi |
| Monitor-lizard—biawak | .. | bab | bieng | mandrong | .. | kai yoh. |
| Grass-lizard—bengkarong | .. | chichoi | manyong | .. | .. | .. |
| Flying-lizard—chichak kubin | .. | .. | .. | .. | .. | .. |
| Land-tortoise—kura-kura baning | .. | .. | .. | .. | .. | .. |
| Water-tortoise—labi-labi | .. | .. | .. | .. | .. | .. |
| Snake—ular | .. | awat | kai yoi | sil | auweh, sil | sul. |
| Python—ular sawah | .. | pelet | ple eb | labi | .. | labi. |
| Frog—kataak | .. | ikop | lajok | tajuk | tajuk | tayok. |
| Fish—ikan | .. | tēlen | telat | .. | talong | telak. |
| Horn—tandok | .. | kōm | kōm | changkai, rengkong | chankeh | kōm. |
| .. | .. | sōp | ka | .. | gading | ka. |
| .. | .. | .. | .. | .. | .. | tandok. |

VOCABULARY—Continued.

| English—Malay. | Pangan of the Cheka River, Pahang. | Semang Paya of Ijok, Selama, Perak. | Sakai Bukit of Lenggong, Upper Perak. | Sakai Jehehr, Temengoh, Upper Perak. | Sakai Jehehr Blukar, Temengoh, Upper Perak. | Sakai Tanjong or Semang Paya, Kampung Padang, near Grik, Perak. |
|-------------------------------|--|---|---|--|---|--|
| Tusk of elephant—gading | gading | bala | .. | .. | .. | gadi. |
| Tail—etur | hath | heru | .. | .. | .. | sintak |
| Hornbill—enggang | turing | kawal-nang | .. | enggang | .. | yag-ang. |
| Hawk eagle—lang | lang | .. | .. | .. | .. | .. |
| Owl—burong hantu | .. | .. | .. | .. | .. | .. |
| Egret—bangau | .. | .. | .. | .. | .. | .. |
| Jungle-fowl—ayan denak | .. | .. | .. | .. | .. | .. |
| Green pheasant—kuau, kuang | .. | .. | .. | .. | .. | .. |
| Argus pheasant—kuau, kuang | .. | .. | .. | .. | .. | .. |
| Crow—gagak | .. | .. | .. | .. | .. | .. |
| Kingfisher—pekakak raja udang | .. | .. | .. | .. | .. | .. |
| Woodpecker—pelatok | .. | .. | .. | .. | .. | .. |
| Magpie—robin—murai | .. | .. | .. | .. | .. | .. |
| Egg—telur | .. | .. | .. | .. | .. | .. |
| Feather—bulu ayam | .. | .. | .. | .. | .. | .. |
| Beak—paroh | .. | .. | .. | .. | .. | .. |
| Ant—semut | .. | .. | .. | .. | .. | .. |
| Red ant—kerengga | .. | .. | .. | .. | .. | .. |
| White ant—antai-antai | .. | .. | .. | .. | .. | .. |
| Bee—lebah | .. | .. | .. | .. | .. | .. |
| Honey—ayer madu | .. | .. | .. | .. | .. | .. |
| Wax—lilin | .. | .. | .. | .. | .. | .. |
| Hornet—tebuan | .. | .. | .. | .. | .. | .. |
| Wasp—penyengat | .. | .. | .. | .. | .. | .. |
| Fly—lalat | .. | .. | .. | .. | .. | .. |

VOCABULARY—Continued.

| English—Malay. | Pangan of the Cheka River, Pahang. | Semang Paya of Ijok, Selama, Perak | Sakai Bukit of Lenggong, Upper Perak | Sakai Jehehr, Temengoh, Upper Perak. | Sakai Jehehr Blukar, Temengoh, Upper Perak. | Sakai Tanjong, or Semang Paya, Kampong Paya, near Grik, Perak. |
|------------------------------|--|--|--|--|---|---|
| Black scorpion—kala | .. | .. | .. | .. | .. | keheb. |
| Small scorpion—kala jengking | .. | .. | .. | .. | .. | tantung |
| Centipede—lipan | .. | .. | .. | .. | .. | .. |
| Millipede—sepak bulan | .. | .. | .. | .. | .. | .. |
| Cockroach—lipas | .. | .. | .. | .. | .. | .. |
| Spider—laba laba | .. | .. | .. | .. | .. | .. |
| Coconut-beetle—kumbang | .. | .. | .. | .. | .. | .. |
| Mosquito—nyamok | .. | .. | .. | .. | .. | .. |
| Tree—pokok kayu | .. | .. | .. | .. | .. | .. |
| Bough—dahan | .. | .. | .. | .. | .. | .. |
| Root—akar pokok | .. | .. | .. | .. | .. | .. |
| Leaf—daun kayu | .. | .. | .. | .. | .. | .. |
| Flower—bunga | .. | .. | .. | .. | .. | .. |
| Fruit—buah kayu | .. | .. | .. | .. | .. | .. |
| Fungus—chendawan | .. | .. | .. | .. | .. | .. |
| Bamboo—buloh, aur | .. | .. | .. | .. | .. | .. |
| Rattan—rotan | .. | .. | .. | .. | .. | .. |
| Thorn—duri | .. | .. | .. | .. | .. | .. |
| Rice—padi | .. | .. | .. | .. | .. | .. |
| .. beras | .. | .. | .. | .. | .. | .. |
| .. nasi | .. | .. | .. | .. | .. | .. |
| Banana—pisang | .. | .. | .. | .. | .. | .. |
| Areca-nut—pinang | .. | .. | .. | .. | .. | .. |
| Durian—durian | .. | .. | .. | .. | .. | .. |
| Tampoi—tempui | .. | .. | .. | .. | .. | .. |
| Rambutan—rambutan | .. | .. | .. | .. | .. | .. |

VOCABULARY—Continued.

| English—Malay. | Pangan of the Cheka River, Fahang | Semang Paya of Jyok Selama, Perak | Sakai Bukit of Lenggong, Upper Perak | Sakai Jehehr, Temengoh, Upper Perak | Sakai Jehehr \| Bukar, Temengoh, Upper Perak | Sakai Tanjung or Semang Paya, Kampong Padang, near Grik, Perak |
|------------------------|---|---|--|---|---|---|
| Sireh-leaf—daun sireh | daun sireh | sireh | sireh | beva | hakek | seket |
| Screw-palm—mengkuang | hakek | bungkuang | .. | aleh | .. | weh dog |
| Terap-tree—terap | ha-op | ka euk | .. | sak | penjok | yiba |
| Forest—hutan | hob | piang | .. | benur | paw (pohr) | hubi |
| Yam—ubi kayu | ktyeh | ka euk | .. | hubi | .. | kembhak |
| " keledek | sumlat | sila | .. | .. | keh | .. |
| " keladi | talus | .. | .. | sur | gang | gah |
| To walk—berjalan | chub | chuk | chib | chup | chub | chug |
| " run—lari | gess | chuk kieng | tampeng | .. | loi | chig kenyon |
| " stand—berdiri | njan | hing, yang | tud | injan | .. | .. |
| " sit—duduk | nog | noka | koit | ingoh | .. | .. |
| " lie down—berbaring | teg (?) | chi, pang | bidung | .. | jeheu | .. |
| " sleep—tidur | teg | tek | pibus | .. | teh | .. |
| " snore—berdengkur | nerkoe | nerkoi | kekong | .. | .. | .. |
| " jump—melompat | melomped | bilei | .. | knokong | dujuk | go gong |
| " climb—memanjat | lu ig | luek | ud | bueh | lompet | lintel |
| " hold—pegang | pegeng | chep | chab | .. | memain | ug |
| " lift up—angkat | angled | tjar | angled | .. | pegen | chab |
| " throw—lempar, lontar | angled | teni teng | bedal | .. | debl | debl |
| " scratch—garu | harad | kijik | gi | luvu | angkat | bntu |
| " spit—ludah | teurf | beg(k) | .. | akat | .. | gr-ih |
| " bite—gigit | kab | ka(ap) | .. | beheng | kebet | kebeg |
| " pinch—chubit | chuit | chuvip | .. | kang | gih | ing-geh |
| " wash—memasoh | sud | .. | .. | chakang | chakoh | chi ken |
| " bathe—mandi | mlae | ilau | .. | soit | lai | sod |
| " cook—memasak | cheth | chita | .. | enlai | soet | mamuk |
| | | | .. | chita | .. | sod bias |

VOCABULARY—Continued.

| English—Malay. | Pangan of the Cheka River, Pahang. | Semang Paya of Ijok, Selama, Perak. | Sakai Bukit of Lenggong, Upper Perak. | Sakai Jehehr, Temengoh, Upper Perak. | Sakai Jehehr Blukar, Temengoh, Upper Perak. | Sakai Tanjong or Semang Paya, Kampong Padang near Grik, Perak. |
|-------------------------|--|---|---|--|---|---|
| To eat—makan | chi | chi | gū | geh | geh | gi. |
| " drink—minum | ūm | bū | ong | am | em | ong. |
| " chew—mamah | tereng | nyiam | kab | | reng | ilud. |
| " fly—terbang | kepote | kapoi | heng | kapoi | chu | poi. |
| Sun—matahari | kanugn | met ketoi | mat yis | ketok | kefok | .. |
| Moon—bulan | rioh | kechek | bulan | beloi | .. | .. |
| Star—bintang | bintang | binteng | bintak | | bintang | .. |
| Cloud—awan | med ketog | ai | sagup | sagup | sagup | .. |
| Mountain—gunong | genarugn | chebal | paah | poh | batuk | .. |
| Hill—bukit | chebak | chebal | tul | bawoh | jelmol pohr | .. |
| Day—siang hari | keruar | met ketoi chi-eh | yis | henlop | upeng | .. |
| Night—malam | nakud | ek-ut | hngong | kerkut | kerkut | .. |
| Thunder—guroh, petir | ketog kalted | kai | kari | kareh | kareh | .. |
| Wind—angin | (?) angin | bewah | choh | bruah | bruah | .. |
| Rain—hujan | haig haid | .... | mih | ersim | lusing | .. |
| Storm—ribut, angin dras | ohmadiseh | ibut | siak | oss | tupan | .. |
| Fire—api | os | os | osh | oss | oss. | .. |
| Water—ayer | tom | betieu | ong | tom | tom | .. |
| Smoke—asap api | yeh os | i-eh os | got-osh | eh oss | i-eh | .. |
| One—satu | sa, or nai | ni | ni | nai yebia | paion | .. |
| Two—dua | dua | bieh | nai | duak | duah | .. |
| Three—tiga | tiga | .. | tiga | liga | .. | .. |
| Four—empat | empat | .. | .. | ampat | .. | .. |
| Ashes—abu | tepiub | tépip | abu | gaip | habok | .. |
| Salt—garam | tepul | siah | empoig | .. | empoit | .. |
| Tobacco—tembakau | tembakau | .. | bakau | .. | jenkut | .. |

VOCABULARY—Continued.

| English—Malay. | Pangan of the Cheka River, Pahang. | Semang Paya of Ijok, Selama, Perak. | Sakai Bukit of Lenggong, Upper Perak. | Sakai Jehehr, Temengoh, Upper Perak. | Sakai Jehehr Blukar, Temengoh, Upper Perak. | Sakai Tanjong or Semang Paya, Kampong Padang, near Grik, Perak. |
|-----------------------------|--|---|---|--|---|--|
| Stone—batu | batu | batuk | .. | batuk | .. | .. |
| Earth—tanah | tēh | teh | teh | teh | teh | .. |
| A Clearing—lading | hāli | humah | humah | selai | s'lai | .. |
| House—rumah, pondok | hanyark | hēteh | kudeng | aiya | hang yet | .. |
| Roof—atap rumah | apoie | hatep | plong | apoi | kapoi | .. |
| Chopper—parang | wign | hik | ped | besi | besi | .. |
| Axe—kapak, beliong | kapak, beliong | .. | beliok | .. | .. | .. |
| Kaife—pisau | landak | batok | lūngkon | taji | kaji | .. |
| Cloth—kain | kain | pinjir | weg | .. | penjohr | .. |
| Girdle—gendit, kendit | tentom | .. | neig beg gab | penjok | .. | .. |
| Spear—lembing | ād | .. | bulus | mata | mata | .. |
| Blowpipe—sumpitan | blau | bla'o | blau yoh | blao | blas | .. |
| Mouthpiece—pangkal sumpitan | tamam blau | taman | tamen | kelutut | tangkal | .. |
| Muzzle—mata sumpitan | kuie blau | .. | nyang | tenlai | puchup | .. |
| Quiver—tabong bekas damak | banuk | gōih | awen | banau | banuk | .. |
| Quiver-cords—tali tabong | tali banuk | .. | .. | aweh | chenoss | .. |
| Dart—damak | tenlaud | tenlaik | .. | tenlaik | tenlaik | .. |
| Point of dart—mata damak | mothr tenlaud | chēmat | selong | ipoh | dog | .. |
| But of dart—pangkal damak | behr tenlaud | libot | telang | brul | brul | .. |
| Dart-holder—sarong damak | pelig | .. | bial | .. | .. | .. |
| Poison—ipoh | douk | dōk | dog | dok | dōg | .. |

XIII. THE BOTANY OF GUNONG TAHAN, PAHANG.

By H. N. RIDLEY, C.M.G., M.A., F.R.S.

LATE DIRECTOR OF BOTANIC GARDENS,
STRAITS SETTLEMENTS.

As it was intended to collect as thoroughly as possible on the highest mountains of the Tahan Range, the plant-collector who was sent ahead with the baggage to Wray's Camp was instructed not to collect till he reached that point, an altitude of 3,300 feet. Unfortunately he was attacked with Malaria immediately he arrived there, and was sent back after our arrival. I had, however, thanks to the kindness of Mr. Robinson, the use of two Dyaks in collecting, who proved very useful and were excellent plant-collectors. The Europeans of the party, Mr. H. C. Robinson, Mr. C. B. Kloss, and myself, started from Kuala Lipis in a house-boat on June 27th, arrived at Kuala Teku on July 3rd, and reached Wray's Camp July 6th, where regular collecting commenced.

No attempt was made at collecting before this point was reached, as the plain country through which run the Pahang and the Tembeling Rivers had been fairly well investigated in my first trip in this region in 1890, as had also the forest-flora of the Tahan River. The account of the plants collected there was published in the 'Transactions of the Linnean Society, Botany,' series 2, vol. iii. pp. 267-408.

These two distinct floras are very different from any floras of the west coast of the Peninsula, that of the plains containing many more of the typical Siamese plants, as well as an additional number of Australian types, missing on the east coast.

A few notes taken *en route* from Kuala Lipis to Wray's Camp, however, may be added here. At Jeram Ampai, in the Tembeling River, while the boats were being drawn up the rapids, I found a new species of *Hedyotis*, described later, in company with *Phyllanthus chamaepeuce*, Ridl., on the rocks, and observed *Passiflora foetida* abundant on the river-bank at Pasir Stengah Laut. This South-American plant, introduced into cultivation in Singapore many years ago, seems now to have spread very widely over the whole peninsula, no doubt dispersed by birds.

Along the Tahan River the Nerrum, *Dipterocarpus oblongifolius*, was in flower as we went up and fruiting on our return,

NOTE.—The Collection on which this paper is based was made by the author in the course of an expedition to Gunong Tahan in July and August 1912 carried out by the F.M.S. Museums. It was intended to form part of a general account of the mountain, the publication of which has been delayed through various causes, though the greater part is in print

In order to secure earlier publication of the various new species Mr. Ridley's paper is therefore printed here and apologies are due to the author for the delay in the issue, which has been unavoidable. Ep.

both in the greatest abundance. The tree seems to be confined to the river-edge, over which the huge trunks lean at such an angle that it is marvellous how they can retain their position. Extremely abundant along the Tahan River, it disappears in the Tembeling River, only a comparatively few trees being seen there. *Grammatophyllum*, which was abundant in the forks of these trees, was in bud at the end of June and in flower on our return in August. The narrow-leaved shrubby *Eugenia Heyneana* was in fruit on the journey up (the fruits are globular, pithy, white, and sweet, with a rather unpleasant flavour, and are widely used as bait for fish), but we found it fully in bloom on our return. I had not previously met with flowers, and the shrub seems to be confined to the Tahan River in this country. It is omitted from the 'Materials for a Flora of the Malay Peninsula.'

The typical Tahan River flora continues up to Kuala Teku. During a day or two's stay at this Camp I examined it, and noted such characteristic plants as *Didymocarpus flicina*, *D. pyroliflora*, *Ixora stenophylla*, *Curcuma sylvestris*, *Hygrophila saxatilis*; *Tristania Whitiana* was a common tree, along the banks and in full flower. *Burmannia tuberosa* occurred in muddy spots near the Camp. Palms were represented by *Oncosperma filamentosa*, *Pinanga disticha*, and *P. subruminata*, one or two Iguanuras, and a good many rattans. But the most interesting was a new species of Bertam palm, *Eugeissona*, which occurred on the hill behind the Camp. On the track towards Wray's Camp I was pleased to recover the beautiful *Eugenia cauliflora*, described by me from a single specimen obtained along the Tahan River. It is a rather small and slender tree, with brilliant crimson flowers borne in clusters on the trunk, resembling those of *Eugenia Malaccensis*, to which the tree is evidently nearly allied.

The woods through which the track to Wray's Camp runs possess a flora much like that of the Tahan forest away from the river, the river-bank flora being absent, the most noteworthy plant seen being the Jungle Waterlily, *Barclaya motleyana*, in a dry patch of mud on the comb of the ridge, a most unusual place for this plant. The men brought into Camp twigs and leaves of a *Cinnamomum* with a very pleasant aromatic taste, which they used as a spice. I was unable to obtain flowers or fruit of it, and certainly never saw it before. *Teysmania altifrons*, Miq., commonly known as *Daun Sang* or *Daun Payong*, but here called *K'roh*, occurs up to about 3,300 feet elevation, close up to Wray's Camp. It is invaluable for roofing huts, as it is easy to fix and quite waterproof and durable.

WRAY'S CAMP.

We reached Wray's Camp, 3,300 feet, on the 6th, and remained till the 9th, during which time I collected a large series of plants in the neighbourhood. Messrs. Robinson and

Wray had previously made collections here, an account of which has been published by me in the 'Journal of the Linnean Society, Botany,' xxxviii. p. 303, the plants recorded therein from 3,300 feet being those collected here. The flora here completely changes on reaching the ridge upon which the Camp is built. Up to this point the flora is that of the Teku woods, and we find such lowland plants as *Calophyllum spectabile*, *Eugenia claviflora*, *Hornstedtia scyphus*, *Memecylon garcinioides*, but along the ridge on which the Camp is built is a more montane flora with some distinct plants. Here we found *Argostemma albociliatum*, Ridl., *Sonerila suffruticosa*, *Gaertnera violascens*, n. sp., *G. lanceolata*, n. sp., *Bulbophyllum virescens*, a variety of *Pterisanthes coriacea*, *Geostachys rupestris*, and *Pentaphragma grande*. Besides these we got a number of the ridge-plants, characteristic of the rocky ridge running to the west. To the north of the Camp lay a deep wooded valley, through the base of which ran the stream which supplied water to the Camp. The most conspicuous plant here was the fine palm *Livistona Tahanensis*, which was very abundant and afforded food to wild elephants. On one of these palms Mr. Robinson espied a beautiful crimson-flowered shrub, which proved to be a new *Pachycentria* and one with the largest flowers known in the genus. Here also grew *Rhododendron longiflorum*. Descending to the stream, I followed it to its junction with another, and followed this to its source, then, cutting our way along the ridge at further side of the valley, joined the track to Gunong Tahan, and returned to Camp by it. The banks of the stream bore many plants peculiar to this district, notably *Xyris grandis*, *Canscora trinervia*, *Tainia vegetissima*, *Nephelaphyllum pulchrum*, and *Cystorchis aphylla*.

SKEAT'S RIDGE.

The track to Gunong Tahan runs along a succession of precipitous sandstone ridges with a distinctly xerophytic flora. This flora stretches along these ridges as far as the Gunong Tahan Padang, and, though part of it disappears, many of the plants still occur at this place. Aroids, scarce after leaving the Kuala Teku, have disappeared, with the exception of *Scindapsus Scortechinii*. Grasses, except for one or two plants of *Isachne javana*, and sedges, except *Galnia tristis* and *G. javanica*, are wanting. Gesneraceæ are represented by an epiphytic *Æschynanthus* and *Parabæa rubiginosa*. The palms, except *Calamus elegans* in the damper spots, have disappeared, for the *Livistona*, though occurring in the damp woods running up to the sides of the rocky ridge, can hardly be said to enter this flora. The hygrophytic ferns, *Alsophila*, *Lastrea*, *Cyathea*, etc., are gone, and replaced by the xerophytic species of epiphytic *Polypodium*, *Dipteris Horsfieldi*, *Matonia pectinata*, *Oleandra neriiformis*, and *Schizæa Malaccana*. The *Dipteris* and *Matonia* were so abundant that we used them for bedding. The characteristic shrubs are *Boeckia*,

Leptospermum, *Vaccinium longibracteatum*, *Rhododendron malayanum*, *Anneslæa crassipes*, *Rhodamnia trinervia*, var. *montana*, *Evodia pachyphylla*, *Gordonia imbricata*, *Symplocos pulcherrima*, *Olea capitellata*; and *Pentaphylax malayana*, its brilliant red shoots making it very conspicuous all over the forest which lay on the slopes of the ridge. *Burmanna disticha*, *Hedyotis patens*, *Spathoglottis aurea*, *Bromheadia rupestris*, with many epiphytic orchids, made up the herbaceous flora.

THE GULLY.

After passing along this ridge for some distance we came to a wide cleft between two lofty precipices, which we call "The Gully," and here is a steep ascent of about 900 feet over broken rocks and mud. The Gully contains many trees of some size and, being very damp, there are many more hygrophytic plants. On the trees near the entrance grows the pretty creeping *Rhododendron elegans*, and among the rocks *Sonerila cæsia* and *S. tenuifolia*, *Phyllagathis hispida*, *Didymocarpus Robinsonii*, *Loxocarpus incana*, *Begonia Herveyana*, *Lastrea calcarata*, and other such plants. At the top, on trees sloping at all angles and draped with olive-coloured moss, grew *Dendrobium cornutum*. The series of plants here is of a Malayan type, and seems to have pushed up from the low-lying woods of the Tahan and Teku valleys.

THE PADANG FLORA.

The Padang is an extensive plateau of open undulating country from 4,600 to 7,186 feet altitude, including herein the higher peaks. The greater part of it consists of sandstone rocks traversed by veins of white milky quartz, and strewn plentifully with quartz-fragments. This region is traversed by small streams which run down from the higher hills to join the Teku. Along the banks of these streams there is a deposit of peaty soil, which is covered with a close dense wood of small trees, the biggest barely 40 feet tall, most of them only an inch or two through, and often only 2 or 3 inches apart, forming a wood very difficult to pass through. Where the ground through which the stream passes is flat, we find a dampish spot with a certain amount of soil, which bears a vegetation of bushes and herbaceous plants mixed.

The entrances of the flora of this area lie between the dry rock-flora of the open Padang and the wet woodland flora of the upper part of the streams. Some plants are common to both, but then are usually, as might be expected, modified to a certain extent, those on the rocks being more adapted for a xerophytic life than those in the woods.

I will treat of these two floras separately:—

THE ROCK-FLORA.—This flora extends with very little variation over the whole of the stone field to the top of the high ridges of Gunong Ulu Riang, 6,600 feet altitude, and the summit of Gunong Tahan at 7,186. The whole of this area

is covered with low shrubs about 2 feet tall, mixed with herbaceous plants. Here and there we find shrubs attaining a height of some 10 or 12 feet, and these occur mostly on elevated hillocks or ridges. The most abundant plant is *Leptospermum amboinense*, and mixed with it is *Boeckia frutescens*. This shrub often takes the form of a prostrate or almost creeping plant in these spots. With these are the dwarf *Tristania*, *Terminthodia*, *Carallia montana*, and *Calophyllum venustum*. Among herbaceous plants *Xyris Ridleyi*, *Schœnus distichus*, *Gahnia javanica*, *Actinoschœnus*, *Scleria carphiformis*, and the two *Nepenthes*, *Singalana*, var. *alba*, and *N. gracillima* are also abundant. *Habenaria zosterostyloides* (a dwarf form) is common also, and looks very different from the tall form in the woods. *Spathoglottis aurea* and *Arundina speciosa* occur more sparingly.

On the rocks where quite bare grow the following orchids:—*Platyclinis linearifolia*, *Bromheadia rupestris* and *B. pungens*, *Tylostylis pulchella*, *Ceratostylis gracilis*, and *Dendrobium rupicolum*. The peculiarity of this flora is shown in the dwarfing of the plants, which in many cases also take on a peculiar yellow colour. This is specially noticeable in *Tylostylis* and the *Ceratostylis*. The rock form of this latter is short, thick, and fleshy, quite erect, and entirely yellow. I found it also in the Teku woods, with slender, soft, pendulous, green stems. The same yellow colouring appears in *Agathis flavescens*, of which the leaves and branches of the trees growing in the open Padang exposed to the full sun are of the same yellow colour, while in the woodland trees the leaves are green. The peculiar ochre-yellow of these plants is represented in the plain country in *Dischidia Rafflesiana*, when it grows (as it usually does) on dying, nearly leafless trees in sunny places by the sea. The flora of the Padang is typically xerophytic, the foliage being stiff and hard, on the whole.

Here and there are damper spots with a little accumulation of soil, and we find besides most of the shrubs here mentioned some additions: *Podocarpus neriifolius*, a curious variety with deflexed leaves, looking as if it was withered; *Dacrydium Beccarii*, which occurs, too, on the drier parts, but less abundantly, and its parasite *Arceuthobium*, *Burmanna disticha*, *Calogyne* creeping over old stumps, *Isachne javana* (the only grass here), *Rhynchospora glauca*, *Lycopodium carolinianum*, and *Eriocaulon silicicolum*. This *Eriocaulon* is replaced in the higher and drier spots by *E. Hookerianum*, which is evidently closely allied, but is a much condensed plant, with short, stiff, coriaceous leaves. I should be quite prepared to find these two species passing into each other, the latter being a mountain or subalpine form. In these damp spots on the Padang occurs the *Pandanus* (*P. Klossii*) as a dwarf stout plant, unbranched, about 8 or 9 feet tall. In the dense woods it attains a much greater height and is more slender and weaker.

THE PADANG WOODS.

The margins of the streams are fringed with dense woods for the most part, the thickest part of the woods with the largest trees being near the source. The trees, however, are by no means large, few reaching to 60 feet tall. These woods run up to nearly 6,000 feet altitude; at one point on the Teku River at 4,500 feet the forest is much larger and the trees bigger. I will speak of these Teku woods later.

In some parts of the Padang woods the forest consists of small trees 2 or 3 inches through, and so close that there are only a few inches between them. It is impossible to get through these without cutting one's way every step. The ground is covered with dense deep moss, in which grows *Cypripedium Robinsonii*, *Elaphoglossum decurrens*, *Geostachys elegans*, *Protolirion*, *Nepenthes Macfarlanei*, *Burmannia longifolia*, etc.: while on the trees are *Dendrobium hymenopterum*, *Bulbophyllum rostratum*, *B. galbinum*, *Phreatia crassifolia*, and *Oberonia condensata*, magnificent plants of *Cælogyne Dayana*, var. *Massangeana*, and the pretty little *Bulbophyllum Skeatianum*. In the more open spaces over the streams we find *Schima noronha*, *Ilex patens*, *Altingia* sp., *Pieris ovalifolia*, *Melastoma* sp., and *Rhododendron jasminiflorum*.

On the stream edges lined with mosses and hepatics we find the three little *Utricularias*, and here, too, grow *Xyris grandis*, *Argostemmas*, and on the stones, in such a position that they must be often submerged, are *Anerincleistus fruticosus*, *Scirpus Clarkei* and *Rhuacophila*. The ferns of this district are all of a xerophytic type—*Dipteris*, *Matonia*, *Polypodium*, and *Gleichenia*,—the hygrophytic *Lastrea* and *Alsophila*, with the *Selaginellas*, being confined to the damp forests or to wet shady banks.

Of Cryptogams I collected a good many mosses and hepatics, but have been unable to work them out at present. Mosses are extremely abundant, at least in amount, the damp forests by the stream edges being deeply carpeted with them, and in some of the cold dark woods just above the Gully and on the Padang the trees are draped in curtains of olive-coloured mosses. Hepaticæ are abundant by the stream. Lichens are less conspicuous, with the exception of *Usnea dasypoga*, which drapes the bushes of *Boeckia* and other shrubs in the bleakest and windiest spots, and *Cladonia macilenta* and *rangiferina*, which form clumps on the ground. Epiphyllous lichens occur on coriaceous leaves in the woods, but are by no means as common as in the low country.

Fungi are conspicuously scanty, and, from the remarkable duration of dead sticks on the Padang, seem to be actually very few in number. Some of the sticks erected by Mr. Robinson in 1906 for surveying purposes seemed to be quite sound and undecayed.

I found one fructification of the common *Polystictus igniarius* at the Camp, which may have been brought up

accidentally on sticks etc. from below, and two or three fructifications of a species of *Fomes* or *Polyporus* in the Teku Woods, but that was all, except, perhaps, a few leaf-fungi in an imperfect state.

In damp spots on the Padang were very conspicuous masses, 2 or 3 inches long, of a brilliant orange-scarlet alga forming small pads.

TEKU RIVER WOODS.

The Teku River commences by the junction of two streams from the watershed of the actual Tahan Mountain, and traverses the Padang through a deep gorge with precipitous sides, eventually joining the Tahan River at Kuala Teku. At the point where it enters the gorge it is joined by the stream that, in descending from the Ulu Riang Mountain, traverses the Padang from north-east to south-west. This stream I have called the Camp stream, because the Camp is placed close to it. This part of the Teku River contains a number of plants which are much more characteristic of the forest-region of the lower Tahan River, and which have not spread up the Padang stream for more than a few yards, such as *Homolomena angustifolia*, *Scindapsus Scortechinii*, *Dipteris Lobbiana*, *Loxocarpus incana*, and *Eurya acuminata*; and the forest which borders the Teku River in this locality, which is of a larger type of tree and more resembles in appearance the forests of the lower Tahan, contains such lowland types as *Plectocomia*, *Freycinetia*, *Curculigo*, *Phyllagathis hispida*, *Polyalthia*, and *Labisia pumila*.

Here we have, it seems, a flora pushing its way up the Teku River from the low country up to an altitude of about 4,600 feet, where it seems to stop. Along the stream we have also a number of plants of Himalayo-Javanese distribution—*Bucklandia*, *Altingia*, and *Itea*.

The last two genera have not been previously met with in the Peninsula. The number of Himalayo-Javanese plants over this region is small, especially when one compares it with the number found in some other parts of the Peninsula, such as Telôm, where occur *Viola*, *Sanicula*, *Sarcopyramis*, and *Disporum*. *Itea* occurs on Kinabalu, and the other two genera above mentioned probably had a very much wider distribution in earlier days and have disappeared except in isolated spots.

Except for these plants the Teku Woods flora seems to be composed of plants from the Tahan valley woods, mixed with a number which have descended from the plateau.

ORIGIN OF THE FLORA.

The flora of this mountain is evidently derived from more than one source, and the distribution of the genera and species found there is very instructive. We have naturally a large Malayan element—that is to say, the element of species and genera which occur chiefly or almost exclusively in Malayan regions. Many of the endemic species of this and

others of our higher mountains appear to be species of the lower country which, having found their way to the tops of the mountains and being able to maintain themselves there, have become modified into alpine forms or adapted in one way or another for life under mountain conditions.

These plants with Malayan affinities are:—

| | |
|------------------------------------|---------------------------------|
| <i>Polyalthia pulchra</i> , King | <i>Webera</i> . |
| <i>Calophyllum venustum</i> , King | <i>Lasianthus</i> . |
| <i>Garcinia monantha</i> , Ridl. | <i>Cephaelis</i> . |
| <i>Adinandra</i> . | <i>Pentaphragma</i> . |
| <i>Elæocarpus</i> . | <i>Embelia myrtillus</i> . |
| <i>Evodia</i> . | <i>Ardisia</i> . |
| <i>Gomphandra</i> . | <i>Symplocos</i> . |
| <i>Salacia perakensis</i> , King. | <i>Alyxia</i> . |
| <i>Euonymus javanicus</i> , Bl. | <i>Gaertnera</i> . |
| <i>Parinarium</i> . | <i>Gesneraceæ</i> . |
| <i>Pygeum</i> . | <i>Nepenthes</i> . |
| <i>Polyosma</i> . | <i>Balanophora</i> . |
| <i>Carallia</i> . | <i>Loranthus</i> . |
| <i>Melastoma</i> . | <i>Henslowia</i> . |
| <i>Anerincleistus</i> . | <i>Cinnamomum mollissimum</i> . |
| <i>Oxyspora</i> . | <i>Choriophyllum</i> . |
| <i>Sonerila</i> . | <i>Orchideæ</i> (all). |
| <i>Phyllagathis</i> . | <i>Dischidia</i> . |
| <i>Medinilla</i> . | <i>Camptandra</i> . |
| <i>Begonia</i> . | <i>Geostachys</i> . |
| <i>Heptapleurum</i> . | <i>Curculigo</i> . |
| <i>Argostemma</i> . | <i>Sciaphila</i> . |
| <i>Urophyllum</i> . | <i>Araceæ</i> . |
| <i>Timonius</i> . | <i>Gnetum</i> . |

In the case of the genera of world-wide distribution, those included in this list, e.g. *Begonia* and *Ardisia*, are represented by species either occurring in or allied most closely to the species in the forests of the lower zone.

A number of these species have obviously crept up the Teku rivers or Tahan rivers, occurring in the adjacent lower country, such as the *Gesneraceæ*, *Araceæ*, and *Melastomaceæ*; some, like the *Loranthi* and *Ardisia*, have drupaceous fruits constantly dispersed by birds and easily borne to these heights.

It is interesting to note that practically all the plants with seeds easily borne by wind, like *Dischidia*, *Orchideæ*, *Sciaphila*, and the vascular Cryptogams, are Malayan forms, with the one exception of *Lycopodium Carolinianum*.

Comparatively few of our highest mountains here have been thoroughly explored as yet—perhaps the best known are Mt. Ophir and Kedah Peak. The former, small as it is, bears a number of plants which are almost or quite peculiar to this mountain and Gunong Tahan. A list of those common to both will be of interest:—

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|--|-------------------------------------|
| <i>Illicium cambodianum</i> , Hance. | <i>Spathoglottis aurea</i> , Lindl. |
| <i>Anneslæa crassipes</i> , Hook. fil. | <i>Arundina speciosa</i> , Bl. |

- Ilex Griffithii*, Hook. fil.
Euonymus javanicus, Bl.
Weinmannia Blumei, Planch.
Rhodoleia Teysmanni, Miq. Also
 Kedah Peak and Telöm.
Boeckia frutescens, L.
Leptospermum amboinense, Bl.
Rhodamnia trinervia, Bl. (mountain form).
Pachycentria tuberculata, Korth.
Psychotria saimentosa, Bl.
Rhododendron malayanum, Jack.
Rhododendron jasminiflorum,
 Hook. fil.
Leucopogon malayanus, Jack.
Embelia myrtillus, Kurz.
Dischidia albida, Griff.
Nepenthes sanguinea, Lindl.
Balanophora multibrachiata,
 Fawc.
Loranthus Lobbii, Hook. fil.
Henslowia Lobbii, Hook. fil.
Podocarpus neriifolius, Don.
Dacrydium Beccarii, Pilg.
Platyclinis linearifolia, Ridl.
Dendrobium uniflorum, Griff.
Eria nutans, Lindl.
Eria monticola, Hook. fil.
Ceratostylis gracilis, Bl.
- Bromheadia rupestris*, Ridl.
 Also Kedah Peak.
Bromheadia pungens, Ridl.
Habenaria zosterostylodes,
 Hook. fil.
Apostasia nuda, Lindl.
Geostachys elegans, Ridl.
Curculigo latifolia, Dryand.
Burmammia disticha, L. Also
 Kedah Peak.
Actinoschænus.
Cladium Maingayi, Clarke.
 Also Kedah Peak.
Lepidosperma chinense, Nees.
 Also Gunong herbau.
Gahnia tristis, Nees.
Isachne javana, Nees.
Gleichenia circinata, Sw.
Matenia pectinata, Br.
Dipteris Lobbiana, Hook.
Lastræa viscosa, Bl.
Polypodium hirtellum, Bl.
Polypodium parasiticum, Mett.
Polypodium cucullatum, Nees.
Polypodium malaccanum, Bak.
 Mt. Ophir only.
Chrysodium bicuspe, Hook.
Schizæa malaccana, Bak.

A good many more widely distributed ferns also occur on both mountains.

On Kedah Peak occur five plants which have not yet been met with elsewhere than on Gunong Tahan. These are *Hedychium collinum*, Ridl., *Dendrobium hymenopterum*, Hook. fil., *Xyris Ridleyi*, Rendle, *Scleria carphiformis*, Ridl., and *Eria lorifolia*, Ridl.

It is probable that further exploration may show their occurrence in intermediate stations.

COMPARISON WITH MOUNT KINABALU IN BORNEO.

The flora of the high mountain Kinabalu has been well worked up from the collections of Dr. Haviland and Low by Dr. Stapf in the 'Transactions of the Linnean Society, Botany,' and we find the following species common to this mountain and to Gunong Tahan:—

- Itea macrophylla*, Wall.†
Clethra canescens, Reinw.†
Leucopogon malayanus, Jack.
Gentiana† (*G. malayana* being
 closely allied to *G. borneensis*).
- Eriocaulon Hookerianum*,
 Stapf†.
Scirpus Clarkei, Stapf†.
Podocarpus cupressina, R. Br.
Dacrydium elatum, Wall.

Burmanna longifolia, Becc.*Eria ferox*, Bl.*Spathoglottis aurea*, Lindl.*Smilax lævis*, Wall.*Podocarpus neriifolia*, Don.*Lycopodium ceylanicum*,

Spring.

Lycopodium casuarinoides,

Spring.

The plants marked † have not yet been found in any part of the Malay Peninsula, except on Gunong Tahan. I have in this list excluded the Ferns, which are mostly widely distributed. There are also a number of species on Gunong Tahan very closely allied to species on Kinabalu, such as *Rhododendron elegans*, Ridl., allied to *R. cuneifolium*, Stapf; *Psychotria densiflora*, Stapf, allied to *Ps. condensata*, King.

The occurrence of these plants seems to show a former land-connection with Kinabalu, as many are species which have neither drupaceous (bird-borne) or wind-borne seeds.

ABSENCE OF THE HIMALAYAN ELEMENT.

As shown in a paper on the flora of the Telôm valley in Perak, we have there a distinct Himalayo-Javanese element represented by such plants as *Viola*, *Sanicula*, *Sarcopyramis*, and *Disporum*. This type of flora seems to be remarkably absent from the Tahan region, as it is from Mt. Ophir and Kedah Peak.

We have, it is true, a series which seem to have come from the Himalayas, but are also Burmese and occur elsewhere in the Peninsula, e.g. *Pyrus* and *Eriobotrya*; *Hedychium collinum*, allied to a species from Burmah and also occurring on Kedah Peak, seems to have crept downwards from the north. The Hamamelideæ (*Bucklandia* and *Altingia*) and the Saxifragaceæ (*Itea*) also occur in the Himalayas and Java.

THE AUSTRALIAN ELEMENT.

All through the Malay Peninsula we find scattered a number of plants which have at least affinities with plants characteristic of Australia or belong to characteristic Australian genera. A greater part of this class of plants disappears north and west of the Peninsula, being absent from the Indian and Ceylon regions.

In the Malay Peninsula they occur on the sea-shore and on the higher parts of the mountains, being absent from the intervening forest-regions. They persist, in fact, in our only xerophytic districts—the sea-coasts and the more xerophytic parts of the higher mountains. They are missing from the wet forest-hills of Perak, although the altitude of these hills is as high or often higher than the xerophytic zone of Mt. Ophir, where they occur.

All, or almost all, of these Australian plants have been met with in similar localities in the islands lying east of the area lying between the Malay Peninsula and Australia, and with an increasing number of species the nearer we get to Australia.

Thus the Australian element is larger on Kinabalu than on Gunong Tahan, and it appears to be larger in New Guinea than on Kinabalu.

On our sea-coasts in the Peninsula we get *Spinifex squarrosus*, *Casuarina equisetifolia*, *Dianella*, *Melaleuca leucadendron*, *Pittosporum ferrugineum*, *Rhodamnia trinervia*, *Phillydrum lanuginosum*, and several species of *Tristania* and *Helicia*.

On Gunong Tahan at high elevations we find *Boeckia frutescens*, *Leptospermum*, *Rhodamnia*, *Tristania*, *Leucopogon*, *Pittosporum*, *Helicia*, *Cryptostylis*, *Dianella*, *Gahnia*, *Schænus*, *Lepidosperma*, *Dacrydium*.

In Borneo, besides these plants, we find *Drimys*, *Drapetes*, *Patersonia*, *Coprosma*, *Trachymene*, *Havilandia* (a genus allied to the Antarctic species of *Myosotis*), *Euphrasia*, and *Ranunculus*, allied to Australian and New Zealand species.

Most of these Bornean plants which do not, as far as is known, occur on any of the Malay Peninsula mountains occur only on Kinabalu at a greater altitude than any of our mountains rise to, and this is probably the cause of their absence.

Such of the mountain genera of Australian origin as can thrive near the sea occur in both localities, such as *Boeckia* on sea-shore rocks in Borneo, *Rhodamnia*, *Tristania*, *Leucopogon* (sea-shores in Singapore and Labuan), *Dianella*, *Gahnia tristis*, *Schænus*, and *Pittosporum*.

One is forced to conclude that at one period there was extending from the Australian region an extensive xerophytic area, which bore an Australian flora. That, probably owing to climatic changes, this flora was swamped by a typical Malay forest-flora of the rain-forest or hygrophytic type, so that all that remains to us are such species as could persist in the only xerophytic regions we possess—the sandy sea-shores and drier mountain-tops.

The rocks of Gunong Tahan have been examined by Mr. Scrivenor, who considers them to be Estuarine and dates them as having probably been deposited between the Rhætic and Inferior Oolitic periods. The flora now on this ground, of course, is of much later date than this, but the sands of these ancient Estuarine beds have been much altered, formed into rock and upheaved, and it must have been at a very much later period that these Australian or far Eastern plants crept along over its surface.

The similar plants occurring on Mt. Kinabalu are believed to have migrated there in Tertiary times (Stapf, 'Flora of Mt. Kinabalu').

I would suggest that the history of this flora was somewhat as follows:—

A big river existed in Northern Pahang, which deposited sand at its mouth which eventually became hardened into rock and elevated as time went on to considerable altitude, and formed the great mass of mountains known as Gunong Tahan

and was connected in the form of cool dry tableland with Mt. Kinabalu on one side and Gunong Kerbau and Mt. Ophir on the other. This tableland was—at least, in part—of granite, for both Kinabalu and Mt. Ophir are of granite. This was the state of affairs in Tertiary times, when this Australian flora, of which we have these few relics left, covered this country.

PLANTS OF THE MOUNTAIN ABOVE 3,300 FEET.

POLYPETALÆ.

ANONACEÆ.

1. *POLYALTHIA PULCHRA*, *King*; *antea*, p. 43. Woods by the Teku River at 4,600 feet altitude.

Distribution. Gunong Bubu and Gunong Kerbau, 4,200 feet.

This is here a moderate-sized tree with large leaves, and flowers 3 inches across, pendulous from the ends of the branches, yellowish white with a purple blotch at the base. It differed a little from the type-form in having the base of the sepals on the back and the petals pubescent. The flowers, though large, can hardly be said to be very beautiful, as their colouring is dull; but they possess the most extraordinarily strong perfume of Magnolias, so powerful that I could easily perceive the odour after the flowers were put in the collecting-book and carried some yards away.

POLYGALACEÆ.

*2. *POLYGALA MONTICOLA*, *Ridley*, *Journ. Linn. Soc., Botany*, xxxviii. p. 303 (1908); *antea*, p. 44. Common in the woods of the Padang. This pretty shrublet varies in size, and is not rarely branched. The flowers are white, with the petals deep rose-pink. The capsule is flattened, usually purple when ripe, the small black seeds enclosed in an orange-scarlet aril.

Distribution. Gunong Semangko, Gunong Bubu, Gunong Kerbau, 6,000 feet, and Benom.

PITTOSPOREÆ.

*3. *PITTOSPORUM* sp., *Ridley*, *op. cit.* p. 303. This plant, first collected by Robinson, is not rare in the open woods on the Padang, but no trace of flowers or fruit were to be seen.

GUTTIFERÆ.

*4. *CALOPHYLLUM VENUSTUM*, *King*; *Ridley*, *op. cit.* p. 304. A common small tree, about 20 feet tall, in open woody places on the Padang, at 5,600 feet elevation.

Distribution. Perak.

5. *GARCINIA MONANTHA*, n. sp.

A small tree, the bark of the branches grey. Leaves coriaceous, ovate or lanceolate-ovate, acuminate, acute, cuneate, 3 inches long, 2 inches wide; nerves 25 pairs, invisible

*Species thus marked occur in the original collection from this mountain (Journal Federated Malay States Museum 11 pp 107-142 (1909)).

above and indistinctly marked beneath; petiole thick, half an inch long. Male flowers not seen. Female flowers axillary, solitary, on short stout peduncles a quarter of an inch long, with several small ovate acute bracts; pedicel short and stout; perianth caducous; ovary $\frac{1}{4}$ inch long, with a rather large, circular, entire fleshy stigma.

Woods on the banks of the streams, Padang.

The only plant seen was past the flowering stage, and description is necessarily very incomplete, but it is so distinct that I venture to describe it. In the solitary axillary flowers it resembles *G. uniflora*, King, but it is very distinct in its smaller, ovate, very coriaceous leaves, in which the nerves are very much more numerous.

TERNSTRÆMIACEÆ.

*6. *ANNESLEA CRASSIPES*, Hook; Ridley, *op. cit.* p. 304. Common on the ridges from 3,300 feet to the Padang at 6,000 feet; a small tree or shrub, in fruit at this time, the fruiting calyx red.

Distribution. Hills of Mt. Ophir and Perak.

*7. *ADINANDRA VILLOSA*, Choisy; Ridley, *op. cit.* p. 304. Collected by Robinson at 5,000 to 5,600 feet. I did not see this plant on this occasion.

Distribution. Perak and Tavoy.

+8. *ADINANDRA ANGULATA*, Ridl. *op. cit.* p. 304. Originally collected by Robinson in this locality. I met with it in the woods near the Teku River at 4,600 feet elevation; a big tree for the genus. The flowers are white and large, the bud conical, half an inch long. The sepals ovate, glabrous, imbricate, with rounded tips $\frac{1}{4}$ inch long. Petals lanceolate, thick and fleshy. Stamens numerous, $\frac{1}{4}$ inch long; filament flat, rather broad, nearly glabrous; anthers acuminate, covered with long hairs; ovary ovoid-conic, tapering into the style, glabrous. Endemic.

*9. *GORDONIA IMBRICATA*, King; Ridley, *op. cit.* p. 305. A shrub or bush only a few feet tall usually, the flowers creamy white. The petals are rather peculiar in having a brown coriaceous patch on the back.

I found a plant with broadly fasciated branches on the Padang across the Teku. It is plentiful from the ridges just above Wray's Camp to the Padang at 6,000 feet altitude.

*10. *SCHIMA NORONHÆ*, Reinw.; Ridley, *op. cit.* p. 305. A fairly large branched tree on the banks of the camp stream on the Padang, in flower up to nearly 6,000 feet.

Distribution. Hills of Burmah, the Malay Peninsula and islands.

*11. *PENTAPHYLAX MALAYANA*, Ridl. *op. cit.* p. 305. Very common on the upper ridges and on the Padang, and very conspicuous from its bright red terminal leaves forming conspicuous patches of colour all over this district. It is a

bush or a small-sized bushy tree. Endemic; the only other species of the genus occurs in China.

12. *EURYA ACUMINATA*, var. *EUPRISTA*. A common large shrub in the rocky stream of the Teku, and less bushy on the streams on the Padang, where it is less common. This shrub is very abundant all up the Tahan River, and seems to have found its way up thence.

Distribution. Himalayas to Fiji.

*13. *TERNSTRÆMIA MACLELLANDIANA*, n. sp; *antea*, p. 44. *Ternstræmia japonica*, Ridley, op. cit. p. 304.

A small tree about 20 feet tall. Leaves thickly coriaceous, drying olive-green above, yellowish beneath, oblanceolate, shortly acuminate and narrowed at the base, more rarely obovate-obtuse, $3\frac{1}{2}$ –5 inches long, 1–2 inches wide; nerves three pairs, hardly visible below, invisible above; midrib prominent below, grooved above; petiole stout, $\frac{1}{2}$ inch long. Flowers from the axils of the upper leaves, solitary in the axil; pedicels thick, decurved, $\frac{1}{2}$ inch long. Calyx with 5 short rounded lobes, $\frac{1}{8}$ inch long, much shorter than the corolla. Corolla half an inch across, white; petals 5, oblong at the base, then obovate, rounded, margins denticulate. Stamens numerous, subsessile, short; anthers longer than the filament, oblong-truncate, rather broad.

Not rare on the Padang. Endemic.

Most nearly allied to *T. Scortechinii*, King, a Malayan species, but with a hardly lobed calyx and different leaves with fewer nerves.

I referred this in the previous paper to the *T. aneura*, Miq., of Banka, which is referred to a variety of *T. japonica*, Thunb., by Hooker. It differs, however, in the much smaller calyx and the almost clawed petals from *T. japonica*. I am pleased to associate this plant with the name of Mr. F. A. S. McClelland, District Officer of Kuala Lipis, who assisted us very materially in making the expedition.

TILIACEÆ.

*14. *ELÆOCARPUS MONTICOLA*, *Ridl. op. cit.* p. 305. Common small tree on the Padang. Endemic.

15. *ELÆOCARPUS RETICOSA*, n. sp.

A small tree, the young parts pubescent. Leaves ovate, abruptly acuminate, acute to lanceolate-acuminate, base rounded, margin thickened, faintly crenulate, with small black processes in the crenulations, stiffly coriaceous, 2 to 4 inches long, 1 to 2 inches wide; main nerves seven pairs, branching and inarching within the margin, polished yellow-brown, strongly reticulate above when dry, and similarly reticulate, with numerous black dots beneath; young leaves red and minutely pubescent on the petiole and midrib beneath; petiole $\frac{1}{2}$ inch long, decurved, pubescent. Panicles from the lower or median leaf-axils, $1\frac{1}{2}$ to 2 inches long; branches and pedicels pubescent. Sepals and petals not seen. Stamens with linear

anthers on very short filaments, glabrous. Torus covered with short stiff white hairs. Fruit ellipsoid, $\frac{1}{2}$ inch long, blue-black. Tree on the Padang, young leaves red; out of flower.

A very distinct species in its coriaceous closely netted leaves.

RUTACEÆ.

*16. *EVODIA SIMPLICIFOLIA*, *Ridl. op. cit.* p. 306. A shrub, rather scarce, in fruit only on the Padang. Endemic.

17. [*EVODIA PACHYPHYLLA*, *King*. Occurs on the ridge above Wray's Camp.]

TERMINTHODIA, gen. nov.

A shrub or small tree. Leaves alternate, unifoliate, articulate on the petiole, glandular, subcoriaceous, obovate, obtuse. Flowers in axillary corymbs, small, green; calyx 4-lobed, lobes rounded. Petals 4, triangular; disc large, 4-angled; gland dotted. Stamens 4; filaments, subulate, short; anthers small. Ovary 4-lobed, protruding from the disc. Style central; stigma small, capitate. Ripe carpels, 1 to 3 developed, boat-shaped, dehiscing along the inner edge. Seeds two in each carpel, small, flattened and winged, pale brown, exalbuminous.

Species one.

18. *TERMINTHODIA VIRIDIFLORA*, n. sp.

A bush 3 or 4 feet tall, occasionally developing into a treelet about 15 feet or more tall; bark wrinkled, dark. Leaves alternate, crowded at the end of the branches, unifoliate, subcoriaceous, bright green, aromatic, obovate, with a rounded entire or retuse apex, or shortly acutely acuminate, nerves about five or six pairs, faintly visible above, elevate beneath, inarching within the margin, paler beneath, and profusely gland-dotted, 2 to 3 inches long, $1\frac{1}{2}$ to 2 inches wide; petiole $\frac{1}{2}$ inch long, articulate with the leaf. Flowers in small pubescent panicles shorter than the leaves, in the upper axils, panicles $\frac{1}{2}$ inch across on a peduncle $1\frac{1}{2}$ inch long. Bracts small, one-tenth inch long, lanceolate-ovate, acute. Sepals 4, rounded, imbricate, pubescent, green. Petals longer, 4, triangular acute, spreading, glabrous, $\frac{1}{2}$ inch long, darker green. Disc large, 4-angled, flat, gland-dotted. Stamens 4, alternate with the petals and nearly as long; filaments thick, subulate. Anthers very small. Ovary protruding from the disc, 4-lobed. Style central. Stigma very small, cocci 1 to 3 usually developed, $\frac{1}{4}$ inch long, boat-shaped, obtuse, green, reticulate when dry. Seed very small, winged, ovoid or obovate, thin, flat, apex rounded, $\frac{1}{8}$ inch long.

Common on the Padang in rocky places. The leaves have a strong turpentine odour when crushed.

This plant is allied to the genus *Evodia*, but differs in its alternate leaves, large square flat disc, and its thin-winged flat seed. There is a distinct line between the lamina of the leaf

and the petiole, but the leaf does not disarticulate when falling. The flowers seem to be always hermaphrodite. I have found bushes in which the flowers were replaced by a globose mass of minute green bracts.

OLACINEÆ.

19. GOMPHANDRA PUBERULA, n. sp.

A shrub with slender branches, pubescent, with yellowish hairs in the young parts. Leaves ovate, acuminate, apex blunt, base slightly narrowed, rounded, thinly coriaceous, nerves 6 pairs, distant, conspicuously interarching well within the margin, indistinct above, elevated beneath, above glabrous, shining beneath, midrib pubescent with yellowish hairs, appressed, the rest covered with profuse scattered short hairs from black tubercles, caducous in older leaves, 3 to 4 inches long, $1\frac{1}{2}$ to $1\frac{3}{4}$ inches wide; petiole yellow, hairy, $\frac{1}{8}$ inch long. Cymes from the lower axils, peduncles $\frac{1}{2}$ inch long with a few short branches. Calyx small, cupular, with 5 small points. Flowers not seen. Fruits fusiform, slightly narrowed at each end, grooved on one side, crowned with round discoid stigma, $\frac{1}{2}$ inch long, $\frac{1}{4}$ inch through, 1-celled and 1-seeded. Seed oblong-ellipsoid, straight, not flattened.

Woods on streams, Padang.

This appears to be nearest to *G. nyssifolia*, King, but with smaller leaves.

ILICINEÆ.

20. *ILEX GRIFFITHII*, Hook. fil. A shrub on the Padang and more common on the ridges. Common in the mountains of the Peninsula at an altitude of 4,000 feet, also in Sumatra (*Forbes*).

21. ILEX RUPICOLA, n. sp.

A shrub with elliptic, obtuse, or subacute coriaceous leaves, rounded at the base, 2-2 $\frac{1}{2}$ inches long, 1-1 $\frac{1}{4}$ inch wide, above smooth, shining; nerves invisible, midrib channelled beneath, glaucescent, midrib prominent, nerves faint, 4-5 pairs; petiole thick, $\frac{1}{8}$ inch long. Panicle shorter than the leaves terminal, $\frac{1}{2}$ inch long, and about as wide, of about six branches. Flowers about 8, subumbellate on the branches, on pedicels $\frac{1}{10}$ inch long, small, white. Sepals orbicular, imbricate, 5, margins ciliate. Petals 5, oblong, hardly connate at the base, edges ciliate. Stamens 5, glabrous; filament short, thick, forming a keel on the back of the elliptic broad anther. Style short, single. Ovary conic. No disc. Fruit globose, $\frac{1}{8}$ inch long, terminated by a short cylindric style-beak. Pyrenes four.

Padang, Gunong Tahan.

Most nearly allied to *I. epiphytica*, King, differing in the foliage and terminal panicle.

22. *ILEX EPIPHYTICA*, King; *antea*, p. 45. On the Padang at 5,600 feet altitude.

Distribution. Perak; (Gunong Kerbau 4,500-6,600 feet).

23. *ILEX PATENS*, n. sp.

A tree with spreading branches; bark black. Leaves alternate, dark green, thinly coriaceous, ovate, entire, obtuse, rounded or slightly narrowed at the tip, base rounded, 2 to 3 inches long, $1\frac{1}{2}$ to 2 inches wide, smooth, glabrous, shining above, lighter beneath; nerves 4 to 5 pairs, almost invisible above, slightly elevate beneath; midrib prominent beneath; petiole $\frac{1}{2}$ inch long. Flowers cymose on peduncles, as long as the petiole, flattened, grooved, occasionally branched, about 5 flowers on a cyme, nearly as large as those of *I. glomerata*, King, white or pale pink. Calyx-lobes 4 or 5, rounded, glabrous. Petals connate at the base, 4; apex rounded. Stamens 4, adnate to the base of the petals; filaments short, white; anthers black. Ovary conic. Fruit globose, with a short rounded style-beak, $\frac{1}{4}$ inch long when ripe, on wider-spreading cymes.

Woods along the stream at the Ninth Camp.

A pretty tree, allied to *I. glomerata*, King, but the petals shorter and the cymes borne on peduncles.

CELASTRACEÆ.

*24. *SALACIA PERAKENSIS*, King; Ridley, *op. cit.* p. 306. Gunong Tahan at 5,000 feet (Robinson), not seen again. Previously collected by Scortechini in Perak.

25. *EUONYMUS JAVANICUS*, Bl; *antea* p. 45. Woods near the Camp stream and on other streams near the Padang.

Distribution. Burmah, Malay Peninsula and islands.

ROSACEÆ.

*26. *PYRUS GRANULOSA*, Bertol.; Ridley, *op. cit.* p. 306. Padang, open woods and borders of streams.

Distribution. Khasiya, Burmah, Sumatra, Malay Peninsula.

27. *ERIOBOTRYA BENGALENSIS*, Hook. fl. A small little-branched treelet with few branches. The leaves more coriaceous and ovate than usual, red when young; flowers white, deliciously fragrant. This is the plant described as *Photinia dubia*, Wall, in previous lists, from which it was separated by Hooker. It occurs in the East Himalayas, Tenasserim, and in the Malay Peninsula.

28. *PARINARIUM COSTATUM*, Bl., var. *RUBIGINOSUM*. A tree about 20 feet tall; the panicles are denser and the stem, backs of the leaves, and flowers more densely covered with ferruginous hairs.

In a wood on the Padang across the Teku.

Distribution of type. Malay Peninsula and Java.

29. *PYGEUM RUBIGINOSUM*, n. sp.

A small bushy tree. Leaves ovate, acuminate, base rounded or retuse, $1\frac{1}{2}$ inch long, $\frac{3}{4}$ inch wide, above smooth, glabrous except the depressed midrib, beneath paler, sparsely hairy except the nerves 6-7 pairs and midrib covered with

rufous appressed hairs, as is the leaf-margin; petiole thick, $\frac{1}{2}$ inch long, rufous, hairy when young. Racemes short, very dense, rufous hairy, under $\frac{1}{2}$ inch long. Bracts oblong-ovate, obtuse, rufous hairy, $\frac{1}{10}$ inch long. Pedicels very short. Calyx campanulate, $\frac{1}{2}$ inch long, with ten very small lobes, all densely red hairy outside. Petals none. Stamens glabrous; filaments slender, red, adnate to the mouth of the calyx-tube. Anthers small, subglobose. Pistil conic, covered with white silky hairs. Style fairly stout. Stigma capitate.

On the Padang and ridges, 5,000–6,000 feet altitude.

Allied to *P. brevifolium*, Hook. fil., of Mt. Ophir, but with different leaves, ovate and very hairy, as are the young branches.

30. PYGEUM PATENS, n. sp.

A treelet about 20 feet tall; branches red, scurfy. Leaves ovate-cuspidate, coriaceous, base rounded, margin entire, above smooth, glabrous, nerves sunk, beneath paler, sprinkled over with short dark hairs, midrib and main nerves 9–11 elevated, red, scurfy, reticulations conspicuous, red, scurfy, 6 inches long, 3 inches wide. Petiole thick, red, scurfy, $\frac{1}{2}$ inch long. Flowers in small fascicles, shorter than the petiole. Bracts small, ovate; peduncle and calyx densely ferruginous, hairy. Flowers minute, $\frac{1}{10}$ inch long. Calyx cupular, with very short lobes, densely hairy. Petals none. Stamens about 15, glabrous; filaments short. Anthers elliptic as long. Style thick, protruding shortly beyond the calyx, hairy. Stigma obscurely lobed, broader. Fruiting peduncle stout, $\frac{1}{2}$ inch long, hairy. Drupe transversely oblong, rounded, 2-seeded, $\frac{1}{2}$ inch long, $\frac{3}{8}$ inch wide, sparsely hairy.

Woods on Gunung Tahan, and below the Gully, not seen on the open Padang.

Allied to *P. Griffithii*, Hook. fil., of Mount Ophir, but the leaves are entire.

SAXIFRAGACEÆ.

*31. POLYOSMA CORIACEA, King, var. LANCEOLATA.

Polyosma coriacea, Ridley, *op. cit.* p. 307.

A small tree, with grey bark. Leaves narrow-lanceolate, glabrous, shining above, glaucous beneath, apex acuminate, base cuneate, nerves indistinct, seven pairs, 4 inches long, 1 inch wide. Raceme terminal, 3 to 5 inches long, rachis glabrous, pedicels $\frac{1}{10}$ inch long, slightly sprinkled with hairs. Calyx-lobes ovate-acute, longer than in the type.

Woods on the Padang (collected also by Robinson in the first expedition, No. 5388). At first sight this plant looks very different from the type-form, which has shorter and broader leaves, but it is connected with it by the next form.

*32. Var. INTERMEDIA. Leaves oblong-lanceolate, lighter in colour when dry, not glaucous beneath; flowers rather larger and calyx-lobes longer.

Woods on the Padang, also collected by Robinson (No. 5493).

*33. *P. LÆTE-VIRENS*, Griff.; Ridley, *op. cit.* p. 307. Padang woods. This form differs from the typical Penang and Perak plants in the larger fruit, which is nearly sessile, and the larger ovate hairy sepals.

34. *ITEA MACROPHYLLA*, Wall. A big tree on the banks of the Teku River, near its junction with the Camp stream. A new record for the Malay Peninsula. It occurs in the Himalayas and the Malay islands.

35. *WEINMANNIA BLUMEI*, Planch.; Ridley, *op. cit.* p. 306. Woods by the Camp stream. Common on all the hill-ranges over 4,000 feet.

HAMAMELIDEÆ.

36. *BUCKLANDIA POPULNEA*, Br. Young trees in the Teku woods at 4,600 feet elevation.

Distribution. Temperate Himalayas, Burmah, Java, and Sumatra.

*37. *RHODOLEIA TEYSMANNI*, Mig.; Ridley, *op. cit.* p. 307. Common on the Padang, a low shrub here. The young leaves are red woolly beneath, becoming white beneath later.

Distribution. Mt. Ophir, Perak Mountains, and Sumatra.

38. *ALTINGIA EXCELSA*, Noronh. In the Teku woods at 4,600 feet altitude. Flowers white. A new record for the Peninsula. The tree occurs also in the Himalayas and Java.

RHIZOPHOREÆ.

39. *CARALLIA MONTANA*, n. sp.

A shrub about 8 or 10 feet tall. Bark black, branches bluntly angled, nodes dilated. Leaves only at the ends of the branches, obovate or elliptic ovate, shortly acuminate, blunt at the tip, cuneate at the base, margin thickened with minute, black, thorn-like processes, coriaceous, shining above, paler, profusely black-dotted beneath, nerves 7 pairs, slender, midrib grooved above, prominent beneath, 2 inches long, $1\frac{1}{4}$ inch wide; petiole stout, $\frac{1}{2}$ inch long, reddish. Cymes axillary, three-flowered; peduncle $\frac{1}{2}$ inch long; pedicels $\frac{1}{4}$ inch long. Flower $\frac{1}{2}$ inch long. Calyx-tube funnel-shaped; lobes triangular, acute, 5, coriaceous. Petals thin, ovate, laciniate, shorter than the sepals, clawed, white. Stamens 10; filaments thick, narrowed upwards. Anthers ovate, minutely cuspidate. Style thick. Stigma wider, discoid.

Gunong Tahan, common on the Padang. Also Kluang Terbang (coll. Barnes) and Gunong Kerbau in Perak (coll. Mohammed Aniff). Apparently allied to Miquel's *C. floribunda*, but with a very much reduced inflorescence.

MYRTACEÆ.

*40. *BAECKIA FRUTESCENS*, Linn.; Ridley, *op. cit.* p. 307; *Antea* p. 46. One of the commonest trees on the ridges and all over the Padang. In the open rocky places of the Padang it often takes the form of a prostrate shrublet only a few inches

high, and varies from that to a bush or, in the woods where the soil is richer, to a tree of considerable size, with a stem a foot or so through. The little flowers are white, with a greenish ring in the centre, which becomes red when the flowers have been open some time.

It is visited by the *Bombus*.

This plant has wide distribution over all our hills, where they are xerophytic, over 4,000 feet. It occurs also as a sea-shore plant on rocks in Borneo. The distribution is from China westwards.

*41. *LEPTOSPERMUM FLAVESCENS*, Sm.; *Ridley, op. cit* p. 307. Common all over the Padang and along the ridges, forming on the Padang a low brushwood about 1 to 2 feet tall. It forms also bigger shrubs of a somewhat erect habit, but never seems to get as large as *Baeckia*.

Distribution. From Australia to the Malay Peninsula at high elevations.

*42. *RHODAMNIA TRINERVIA*, var. *UNIFLORA*. A shrub about 12 or 14 feet tall with slender branches, the young parts silky. Leaves ovate, abruptly acuminate, base rounded, thinly coriaceous, entirely silky when young, glabrescent, shining above when adult and white silky beneath, the three nerves prominent beneath, with about eight pairs of secondary nerves at rather an acute angle, 2 to 3 inches long, $1\frac{1}{2}$ inch wide; petiole very short. Flowers few or solitary, axillary or terminal, sessile, $\frac{1}{8}$ inch across, white. Calyx obconic, silky, with short-ovate lobes. Petals white, glabrous, oblong-lanceolate; stamens short, just protruding from the calyx-tube. Berry globose, $\frac{1}{8}$ inch long, silky, terminated by the short-oblong calyx-lobes.

In low scrub at Wray's Camp and on the Padang.

Different as this plant is in appearance and in the solitary sessile flowers and the silky fruit from the long-leaved tree with small panicles of flowers and glabrous fruit, I conclude it to be an alpine form of this species. A shrub from Mt. Ophir (No. 3229 of my collections) much resembles this in foliage, but the flowers are more numerous, pedicelled, and not silky, with wider petals—in fact, an intermediate form between the typical lowland species and the Tahan one.

43. *EUGENIA STAFFIANA*, King. A tall shrub or treelet with bright green leaves and white flowers. On woods on the Padang across the Teku River. It occurs in the hills of Perak and Selangor.

*44. *EUGENIA PAHANGENSIS*, *Ridl. op. cit.* 307. A big shrub; flowers tinted with pink. The fruit is an inch long, globose, and dull pink, and occasionally contains two seeds, Endemic.

45. *EUGENIA TAHANENSIS*, n. sp.

A shrub about 5 feet tall; bark black. Leaves stiffly coriaceous, obovate-obtuse, rounded at the top or shortly acute, base cuneate, $3\frac{1}{2}$ inches long, $2\frac{1}{2}$ inches wide; nerves

5 to 7 pairs, very slender and obscure; midrib grooved above, thick and elevated beneath; the leaves dry pale brown, lighter-coloured beneath; petiole $\frac{1}{2}$ inch long. Cymes compound in the upper axils, 2 to 3 inches long; many-flowered, the branches obscurely angled. Pedicels short, oblong, angled. Flowers white, resembling those of the preceding species. Calyx-tube oblong-conic, $\frac{1}{2}$ inch long; lobes small, ovate. Petals small. Fruit oblong, globose; the base rounded, emarginated by the short oval sepals.

Gunong Tahan at the top in a small woody patch, at 7,186 feet altitude.

This species is certainly allied to *E. Pahangensis*, but is distinct in its obovate leaves, narrowed at the base, and the much fewer nerves. The leaves are also less thickly coriaceous.

* 46. *EUGENIA VIRIDESCENS*, *Ridl. op. cit.* p. 308. A shrub with buds white tipped with pink. Common on the Padang. Endemic.

47. *TRISTANIA FRUTICOSA*, n. sp.

Usually a small shrub about 3 or 4 feet tall, bushy; the bark red, flaking off. The leaves crowded, coriaceous, oblanceolate-obtuse, shortly narrowed towards the blunt tip and narrowed gradually to the base, dark green, drying greenish yellow above, yellow beneath, nerves 30 pairs, joining a fine intramarginal vein within the edge, midrib prominent beneath, 2 to 4 inches long, 1 to 2 inches wide; petiole thick, winged to the base, $\frac{1}{2}$ inch long. Cymes axillary and terminal, numerous, shorter than the leaves, 1 inch long; peduncle stout; pedicels short, thick. Flowers $\frac{1}{2}$ inch across, calyx-lobes 5, triangular, spreading. Disc large, flat. Petals obovate, clawed, small. Stamens numerous, filaments very short in fascicles; anthers small. Capsule $\frac{1}{2}$ inch long, dehiscent into three ovate lobes, on the remains of the calyx in the form of a flat spreading saucer. Seeds three in each cell, $\frac{1}{2}$ inch long, crescent-shaped or oblong-cuneate, flat, light brown.

Abundant on the Padang. In the thicker woods there were trees of larger size which may belong to this species, but I could get no flowers on these.

The species is allied to *T. Merguiensis*, but differs in the glabrous flowers and the shallow flat calyx with longer points.

MELASTOMACEÆ.

48. *MELASTOMA LONGISEPALA*, n. sp.

Melastoma malabathricum, *Ridley, op. cit.* p. 508.

A tall straggling bush about 12 feet tall. Leaves subcoriaceous, lanceolate-acuminate, shortly narrowed at the base, 4 inches long and 1 inch wide, glabrous above, beneath hairy on the nerves with broad flattened scalelike hairs, nervules finely hairy; petiole scaly, hairy, $\frac{1}{2}$ inch long, red. Flowers on pedicels $\frac{1}{2}$ inch long. Bracts 2, lanceolate-acute, red. $\frac{3}{4}$ inch long. Calyx $\frac{1}{2}$ inch long, covered with pale yellow scales;

lobes as long as the tube, linear-oblong, acuminate, cuspidate, hairy on the back and tip, smooth within, red. Petals light rose-colour, obovate, rounded, $\frac{3}{4}$ inch long; stamens 5, similar; filaments white at the base, jointed above, upper part curved, yellow with a 2-forked process at the base, apex violet; anthers violet, acuminate. Style bright red.

On banks of streams, Padang.

This has the habit of *M. sanguinea*, but the scale-hairs on the calyx are like those of *M. Malabathricum*.

49. *ANERINCLEISTUS ROBINSONII*, *Ridl. Journ. Straits Branch Roy. Asiat. Soc.* No. 57, p. 46 (1910). Common in the woods along the Teku River at 4,600 feet altitude. Flowers white. A shrub about 4 feet tall. Endemic.

50. *A. PULCHRA* (*Oritrephes pulchra*, *Ridley, op. cit.* p. 309). This plant was mixed with the preceding in the collections made by Robinson, and distributed under No. 5,509. The character of the genus *Oritrephes* was the baccate and apparently indehiscent fruit, not opening by valves at the apex. The fruit in the specimen first examined was apparently nearly ripe. Other specimens, however, now show that the fruit at a later stage does dehisce by valves as in a true *Anerincleistus*, and that the plant is allied to *A. grandiflora*, *Ridl.*, of the Semangkok Pass.

This section of the genus is, however, very distinct in habit from the type as represented by *A. hirsutus*, *Korth.*, and its ally, and, if not generically separated, this group might be distinguished as a section under the name of *Oritrephes*, the description being amended.

This species, which was not in flower at the time of my visit, is abundant on the open woods of the Padang. It should be pointed out that the stems and branches are distinctly quadrangular.

* 51. *ANERINCLEISTUS FRUTICOSUS*, *Ridl. op. cit.* p. 309. Very common in the rocky streams of the Padang, varying in size from a few inches tall, with one or two slender stems, to a stout woody plant with a stem half an inch or an inch through and over a foot tall, with red-brown bark bearing a cushion-shaped mass of branches. It grows in cracks in the rocks, and must frequently be covered by the rushing torrents. The calyx is red, and the buds, tinted with pink, expand in the early morning to a large, white, pointed star, half an inch across. The stamens are all similar and fertile.

This plant is certainly very unlike any other species known to me, and in fruit at least resembles a *Sonerila*. Endemic.

52. *OXYSPORA HIRTA*, n. sp.

A tall shrub with few branches, base of stem bare, corky, white, 5 to 6 feet tall, leafy only at the top. Leaves lanceolate to ovate-lanceolate, herbaceous, rather stiff, apex acute, base peltate, cordate, 8 inches long, 3 inches wide, nerves 3, conspicuous, nervules horizontal, numerous, above glabrescent,

beneath hairy with small hairs, the nerves densely covered with longer black hairs, as are the margins of the leaf; petiole 3 inches wide, black, hairy. Panicle in fruit, terminal base with spreading branches, hairy, 8 inches long. Fruit pink, elongate urn-shaped, narrowed to the base, $\frac{1}{2}$ inch long, on a pedicel as long, glabrous.

Damp woods in the Gully and the first Padang stream in fruit only.

Allied to *O. rosea*, Ridl., of the Tahan River and Trengganu, but differing in the rounded cordate peltate leaf-base and its hairiness.

53. [PACHYCENTRIA SPECIOSA, n. sp.

Epiphytic shrub, strongly woody, with a stem over a foot tall, $\frac{1}{2}$ inch through, bark grey, branched above, branches knotted. Leaves fleshy coriaceous, ovate-lanceolate, narrowed to an obtuse tip, base shortly narrowed, nerves 3, not very conspicuous except the midrib beneath, 2-3 $\frac{3}{4}$ inches long, 1 inch across, petiole $\frac{3}{8}$ inch long. Flowers in umbelled red viscid cymes, terminal on the branches; peduncle $\frac{3}{4}$ inch long, cyme-peduncles $\frac{1}{2}$ inch, pedicels $\frac{1}{2}$ inch, each cyme of 3 flowers. Bracts minute, tooth-like. Calyx-tube dilate at base, over the ovary subglobose, above a tube ending in a shortly 4-lobed limb, constricted below, $\frac{1}{2}$ inch long, red, viscid. Petals 4, ovate, cuspidate, rose-pink, $\frac{1}{2}$ inch long. Stamens 8, unequal, 4 short, 4 rather longer, all similar in form; filaments linear, long, flat; anthers yellow, cylindric, acuminate-arcuate, base bifid with two short curved points, connective at the back of the base, prolonged into a short linear process.

Above Wray's Camp on a *Livistona Tahanensis*, Becc. This beautiful plant is distinct in possessing the largest and showiest flowers of any recorded species. The whole of the inflorescence is very viscid and gummy, as is the case in other species of this genus.]

54. SONERILA CÆSIA, Stapf. A large form in the Gully below the Padang.

Distribution. Perak and Telom in Pahang.

55. SONERILA TENUIFOLIA, Bl. *antea*, p. 46. In the Gully and damp spots along the first stream on the Padang beyond the waterfall.

Distribution. Mountains of the Peninsula, Java, and Borneo.

56. PHYLLAGATHIS HISPIDA, King. In the Gully and the Teku woods up to about 4,600 feet elevation. Common in the woods of the Tahan River and in Perak.

*57. MEDINILLA PAHANGENSIS, Ridl. *op. cit.* p. 310. Gunong Tahan at 5,000 feet (Robinson). Not seen again. Endemic.

58. M. HASSELTII, var. Epiphyte, stem white, with dark warts. Leaves elliptic-lanceolate, blunt, slightly narrowed at the base, fleshy, pale beneath, nerves 3, prominent on the

back, 4 inches long, $1\frac{1}{2}$ inch wide; petiole slender. Cymes axillary below the leaves, 2 inches long; peduncle 1 inch, branches and pedicels spreading, pedicels $\frac{1}{2}$ inch long. Fruit $\frac{1}{2}$ inch long, small, cupular, with four short sepals.

Padang woods.

This differs from typical *M. Hasseltii*, Bl., in its elliptic blunt leaves, and may be a distinct species, but I could get no flowers.

*59. MEMECYLON MAINGAYI, Hook. fil.; Ridley, *op. cit.* p. 310. I found this plant in fruit again as it was collected by Robinson on the previous expedition, and can confirm his statement that it is a climber. As no *Memecylon* is known to be scandent, and the plant looks otherwise different from any typical species of the genus, I am doubtful as to what it really is.

BEGONIACEÆ.

*60. BEGONIA HERVEYANA, King; Ridley, *op. cit.* p. 310. In the Gully. The petioles are cooked and eaten by Malays.

Distribution. Pahang and Perak. Common in the hills.

ARALIACEÆ.

61. HEPTAPLEURUM GLOMERULATUM, n. sp.

Erect treelet. Leaves digitate, petiole terete, 14 inches long, leaflets 8, petiolules 2-3 inches long, blade thinly coriaceous, elliptic-ovate, cuspidate, rounded, or narrowed slightly at the base, nerves impressed above, elevated beneath, 6 inches long by 3 inches wide, drying black, paler beneath. Panicles short, not fully developed, with several branches, scurfy. Flowers sessile, in small globose heads subtended by lanceolate-acuminate bracts, $\frac{1}{2}$ inch long, ciliate on the margins. Floral bracts similar, smaller and narrower. Calyx short and broad, turbinate. Petals pubescent, ovate, blunt, connate. Stamens 6, short, filaments very short, not as long as the anthers; anthers elliptic, blunt. Stigmas connate, forming a blunt cone.

Woods on the banks of the stream at the Ninth Camp. Several trees of this were seen, but only one bore young flowers.

The tree is allied to the little-known *H. Scortechinii*, but differs in the broader, shorter, thinner leaves and bracts flat, not convolute, lanceolate-cuspidate, and ciliate with white hairs.

62. HEPTAPLEURUM ELEGANS, n. sp.

A tall, rather slender-stemmed plant. Leaves digitate, with ten leaflets, leaflets elliptic, cuspidate, coriaceous, drying dark brown, polished above, glabrous, 4 inches long, $1\frac{1}{2}$ inch wide; nerves six pairs, indistinct; petiolule 1 inch long; petiole 10 inches long, rather slender, $\frac{1}{2}$ inch through when dry. Panicles numerous, about 5, strict, erect, 12 inches long, basal 3 inches nude, terete, above with distant umbels half an inch long; peduncles scurfy; flowers small, about 20 in an umbel.

Bracts very small, lanceolate, scurfy brown; pedicels $\frac{1}{10}$ inch long; ovary obconic; petals ovate-obtuse, connate, as long as the ovary; sepals reduced to minute points. Stamens very short; filaments as long as the elliptic-ovate, obtuse, deeply grooved anthers. Disc umbonate, rugose.

On the Padang in small woods. Endemic.

Most nearly allied to *H. Hullettii*, King, but a taller slenderer plant with smaller leaves.

63. *HEPTAPLEURUM CORIIFOLIUM*, *Ridl.* Common on the Padang. A fairly large erect shrub here, about 8 feet tall. On Gunong Berumbun in Perak, where the type was found, it was adwarf shrub only a couple of feet tall.

GAMOPETALÆ.

CAPRIFOLIACEÆ.

64. *VIBURNUM LONGISTAMINEUM*, n. sp.

A shrub about 12 feet tall. Leaves opposite, elliptic-cuspidate, base cuneate, membranous, glabrous, with four pairs of nerves, slender above, fairly stout, elevate beneath, $3\frac{1}{2}$ – $4\frac{1}{2}$ inches long, 2 inches wide, petiole half an inch long, all glabrous except for a tuft of hairs in the nerve-axils. Corymb terminal on peduncle, 2 inches long; branches umbellate, $\frac{3}{4}$ inch long, secondary branches $\frac{1}{2}$ inch long, umbellate, all subglabrous with a few white hairs. Bracts very small, ovate. Flowers sessile, white; calyx oblong, with 5 very short lobes, ovate, margins ciliate. Corolla shortly campanulate, with 5 ovate spreading lobes, white; whole flower $\frac{1}{2}$ inch long and as wide. Stamens 5; filaments four times as long as the corolla, spirally twisted, $\frac{1}{4}$ inch long, white; anthers elliptic, obtuse, dorsifixed. Pistil short conic, truncate, ribbed; stigma small, conic.

Woods by the streams on the Padang at 5,600 feet elevation.

Allied to *V. sambucinum*, Bl., the common low-country species, but nearly glabrous, with a smaller corymb (2 inches across) and very long projecting stamens.

RUBIACEÆ.

65. *ARGOSTEMMA INVOLUCRATUM*, *Hemsley*. Common on banks of streams on the Padang.

Distribution. All the higher hills of the Peninsula.

*66. *ARGOSTEMMA MUSCICOLA*, *Ridl. op. cit.* p. 310. Common on banks of streams in the Padang, also at Wray's Camp. This plant, besides being a tufted erect herb, creeps with a slender stem and distant leaves. Endemic.

67. *ARGOSTEMMA ELONGATUM*, n. sp.

Stem succulent, creeping, 2 feet or less long, with slender roots from the nodes, which are 3 inches apart. Leaves very unequal, the larger ones thin, succulent, glabrous, ovate-acuminate, base rounded, pale beneath, with 10 to 12 pairs of

thin nerves, 3 inches long, 1 inch across; petiole $\frac{1}{2}$ inch long, the small leaf sessile, lanceolate-acuminate, $\frac{3}{8}$ inch long, $\frac{1}{8}$ inch wide. Stipules ovate, obtuse. Flowers about 4 on a peduncle, an inch long, with 4 stipuliform bracts about halfway up, glabrous below, pubescent above the bracts. Floral bracts linear, $\frac{1}{10}$ inch long. Pedicels $\frac{1}{2}$ inch long, pubescent. Calyx campanulate, hairy, $\frac{1}{8}$ inch long, the lobes lanceolate-acuminate, nearly as long as the tube. Corolla white, half an inch across; tube very short; lobes 5, lanceolate-acuminate, acute. Stamens as long as the petals, lanceolate-acuminate, beaked.

In thick woods on the bank of the Teku River at about 4,600 feet altitude.

This is most nearly allied to *A. Hookeri*, King, but the leaves are larger and more remote and the flowers are smaller.

*68. ARGOSTEMMA YAPPII, King; Ridley, *op. cit.* p. 311. Common in shady wet spots up to 7,100 feet elevation on Gunong Tahan.

Distribution. Hills of the Malay Peninsula.

*69. HEDYOTIS PATENS, Ridl. *op. cit.* p. 311.

A very common plant from Wray's Camp, 3,300 feet elevation, to the top of Gunong Tahan, in open places among low bushes. The plant is very variable in size, tall with a widely spreading panicle in the denser thickets by Wray's Camp, short and more compact in leaf and panicle in the open dry Padang. I never saw it creeping, as described by Robinson. The petals are usually greenish white, occasionally purplish, and when open are curled back so as to expose the long projecting stamens. These are extended in a horizontal direction, the two lower ones slightly longer than the three upper ones. The anthers are purple. The flower opens in the morning very early, and the petals curl back. The stamens are projecting and the style is only $\frac{2}{3}$ of the length of the stamens. On the second day the stamens are withered and the style is now considerably longer than them and is projecting horizontally. In the ordinary species of the genus the short stamens hardly protrude their tips from the mouth of the tube and the petals are not recurved, and they do not appear to be visited by Hymenoptera. The structure of the flower of *Hedyotis patens* appears to be unique in the genus. The flowers, which are very inconspicuous, are visited and regularly pollinated by a species of *Bombus*. This insect spends the whole day, from shortly after sunrise to sunset, at these flowers, almost to the exclusion of any other flower, wherever the *Hedyotis* is abundant. I have, however, seen it at work on *Xyris grandis*, *Melastoma longisepala*, and *Baeckia*. It does not fly from one species to another, but confines its attentions to the *Hedyotis* or *Xyris* as long as there are any in the vicinity. In attacking the *Hedyotis*, it clings to the branches of the cyme and inserts its proboscis above the stamens, in such a way that the anthers brush the underside of the abdomen. It visits also flowers in which the stamens

have withered and the style has attained its full development, and strikes the abdomen beneath as the stamens previously did.

The humble bees, *Bombi*, are by no means common in the Malay Peninsula, and are practically, it appears, confined to this and a few other of our mountains and Tenasserim. The flower of the *Hedyotis* seems to be specially suited for pollination by the humble bee, and it may be suggested that its peculiar modification is a special adaptation for pollination by this insect.

70. [*HEDYOTIS RIVALIS*, n. sp.]

A branched weedy plant, about $2\frac{1}{2}$ to 3 feet tall. Stem $\frac{1}{10}$ inch through, half woody with a pithy centre, subquadrangular, with four narrow ribs running from the basal angles of the stipules. Leaves linear, acuminate, acute, base narrowed gradually to the petiole, glabrous, subcoriaceous, drying yellow-green, $3\frac{1}{2}$ inches long, $\frac{1}{8}$ inch wide or less, glabrous. Stipules broadly triangular, mucronate, scurfy, $\frac{1}{8}$ inch long. Inflorescence axillary and terminal of dichotomous cymes an inch long with a few flowers on short pedicels at the base; cyme-branches half an inch long with about 3 flowers in each cymule, lower cymes rebranched. Bracts small, linear, acute. Flowers small, white, $\frac{1}{8}$ inch long, very shortly pedicelled. Calyx small, campanulate, with 5 rather large ovate-lanceolate pubescent green lobes longer than the tube. Corolla-tube cylindric, glabrous, twice as long as the calyx-lobes, ribbed; lobes oblong-acute, pubescent, recurved, as long as the tube. Stamens 5, adnate to the mouth of the tube; anthers linear-oblong, just protruding at the tips. Style stout, stigmas elliptic, rather large. Disc pulvinate. Capsule ovoid, pale, $\frac{1}{10}$ inch long, crowned with the persistent calyx-lobes. Seeds minute, very irregular in form, acutely angled, black, reticulate.

On rocks at Jeram Ampai, Tembeling River.]

71. *UROPHYLLUM GLABRUM*, Wall. In the Teku woods, apparently not common. I did not see the plant here, but below Wray's Camp, 3,300 feet alt., I found a remarkable plant of the *Griffithianum* form which was a tall bush, like an elder bush, with a stem 4 inches through at the base, and strict erect branches, all covered with pale corky bark. The rest of the plant was quite indistinguishable from the ordinary slender shrub, which is little or not branched from the base and with smooth green or brownish thin bark.

The species is common all over the Peninsula and most of the Malay islands.

*72. *TIMONIUS MONTANUS*, Ridl. *op. cit.* p. 312. Common on the Padang. A slender treelet like *T. jambosella*, but with smaller leaves and slender flowers. The fruit is very distinct, being small, narrowly ovoid, narrowed to the apex, $\frac{1}{4}$ inch long, and black. Endemic.

73. *WEBERA STELLULATA*, var? A shrub only obtained in fruit may perhaps belong to this species. It was found in the Teku woods,

*74. *IXORA ROBINSONII*, n. sp.

Shrub, with dark brown bark. Leaves coriaceous, oblanceolate to ovate-lanceolate, acuminate, apex blunt, narrowed at the base, nerves slender, about ten pairs, midrib prominent beneath, grooved above, petiole winged to base, 4 to 7 inches long, 2 inches wide. Stipules connate, cylindric, truncate, mucronate, persistent. Cyme large, lax, with several branches, many-flowered, 3 inches long, 4 inches wide. Flowers red, on pedicels $\frac{1}{10}$ inch long; lobes ovate-subobtusate, shorter. Corolla $2\frac{1}{2}$ inches long; tube slender, 2 inches long; lobes 5, half an inch long, lanceolate-acute, acuminate, narrowed at the base, red. Style shortly protruded, grooved.

Pahang, Gunong Tahan (Robinson, 5304). It occurs from a little above Wray's Camp, 4,000 feet alt., to the Gully, about 5,500 feet alt. Accidentally omitted from the original publication of the Gunong Tahan collections. A very distinct species in its coriaceous leaves, and large flowers an inch across, with acute lobes narrowed at the base. Nearest perhaps to *I. stricta*, Roxb. A most beautiful, perhaps the most beautiful of the *Ixoras*; the flowers of a salmon-red in a fine spreading cyme.

75. *LASIANTHUS FLAVINERVIUS*, n. sp.

Shrub, stem, and young parts covered with appressed yellow hairs. Leaves elliptic, acuminate, base slightly narrowed, above glabrous, smooth, shining, beneath nerves and secondary nerves strongly elevated and covered with yellow hairs, nerves 7 pairs, nervules transverse, parallel, almost horizontal, reticulations distinct, 6 inches long, 2 inches wide; petiole yellow silky, $\frac{1}{2}$ inch long. Stipules very short, with two or three short teeth, all yellow hairy. Cymes shorter than the petioles, few-flowered. Flowers small, very shortly peduncled. Calyx $\frac{1}{8}$ inch long, campanulate, with 5 short teeth, hairy, tipped with blue. Corolla silky. Fruit $\frac{1}{2}$ inch long, campanulate, narrowed at the base, with five large, linear, lanceolate teeth, $\frac{1}{10}$ inch long, all hairy and blue. Pyrenes 4, backs rounded, front angled.

Gunong Tahan woods. Endemic.

Perhaps nearest to *L. pilosus*, Wight. The fruit is rather peculiar in its size, long sepals, and hairiness.

76. *LASIANTHUS ROBINSONII*, Ridley. In the Gully and Teku woods. In fruit. Also occurs on the ridges at Telom.

77. *LASIANTHUS MONTANUS*, King & Gamble. Woods round the Padang.

Distribution. Perak.

*78. *LASIANTHUS CHINENSIS*, Benth.; Ridl. op. cit. p. 312. In the Gully.

Distribution. Perak, China.

*79. *LASIANTHUS CORONATUS*, King & Gamble. Common in the Padang woods and at Wray's Camp. A low shrub.

Distribution. Perak.

80. CEPHAELIS ALBIFLORA, n. sp.

A tall branched shrub 6 feet or more high. Leaves membranous, thin and flaccid when dry, oblanceolate-acuminate, acute, narrowed a long way to the base, glabrous, 6 inches long, 2 inches wide; nerves 10 to 11 pairs, slender; petiole $1\frac{1}{2}$ inch long. Stipules lanceolate-ovate, mucronate. Peduncles terminate, green, flattened, 2 inches long; capitulum of 17 sessile flowers. Bracts several, ovate, rounded, truncate, green, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, one below the head on the peduncle ovate-acute, cuspidate. Floral bracteoles linear-lanceolate, very small. Calyx-tube thick, with very short obscure lobes. Corolla-tube cylindric, half an inch long, with white hairs in the mouth; lobes ovate-acute, reflexed, the tips hairy. Stamens projecting above the mouth of the tube, oblong-obtuse, white. Style filiform, long. Stigma broad, transversely oblong, bilobed.

Common in woods by streams on the Padang.

A very distinct plant in its size and in the thin leaves and white flowers; allied to *C. cuneata*, Korth.

81. PSYCHOTRIA SARMENTOSA, Bl., var. On the Padang in woods, climbing. I take this to be a mountain form of *P. sarmentosa*, reduced in all parts and with more coriaceous leaves. I have somewhat similar forms, but less distinctly condensed, from Mount Ophir and Matang in Borneo.

The species is common all over the Malay Peninsula and islands.

82. PSYCHOTRIA BRACHYBOTRYS, Ridl.

Scandent; stem herbaceous, branched; internodes an inch long. Leaves subcoriaceous, lanceolate, base acuminate, apex long-cuspidate, 7-nerved, glabrous, 4 inches long (including the cusp half an inch long), 1 inch wide; petiole slender, $\frac{1}{4}$ – $\frac{1}{2}$ inch long. Stipules connate, broad, with a short point. Cymes terminal, elongate, $1\frac{1}{2}$ –4 inches long; peduncles 3 inches long, terminated by small dense cymes an inch long, secondary branches scabrid. Bracts ovate-acuminate, $\frac{1}{8}$ inch long. Flowers in the terminal umbels about 20; pedicels in flower, $\frac{1}{10}$ inch long, minutely pubescent. Calyx saucer-shaped, with 5 short teeth, pubescent. Corolla $\frac{1}{8}$ inch long; tube thick, short, pubescent; lobes 5, bluntly lanceolate, nearly as long as the tube, densely woolly within the tube to the base. Stamens barely protruding from the mouth of the tube; filaments free nearly to the base; anthers elliptic. Style longer, stigmatic; arms 2, recurved. Fruit globose, white, pulpy, $\frac{1}{2}$ inch long when dry, on a pedicel $\frac{1}{8}$ inch long. Pyrenes flattened on the inner face; back rounded, with five ribs.

Gunong Tahan in the Gully, climbing on bushes by means of its petioles.

Distribution. Gunong Berumbun near Telom.

Near *Ps. Kunstleri*, King & Gamble, but has long cuspidate leaves and five-ribbed seeds. The specimens from which

the plant was originally described were not fully developed, so I have given a fuller description of it.

83. *PSYCHOTRIA CONDENSEA*, King & Gamble. Small compact shrub, epiphytic, with close-set, coriaceous, lanceolate-acuminate leaves with slightly narrowed base, 1 inch long by half an inch wide, glabrous, shining above, with the nerves almost invisible; petiole $\frac{1}{10}$ inch long. Flowers in short dense cymes, shorter than the leaves, $\frac{3}{8}$ inch long. Calyx shallow, with 5 very short teeth, glabrous. Corolla thick, tubular, scurfy outside, the lobes oblong-obtuse, not half as long as the tube, inside white, woolly round the stamens, glabrous above and below. Stamens with short filaments, shorter than the oblong-obtuse, rather large anthers. Style long, slender, glabrous, bifid at the tip. Fruit nearly a quarter of an inch long, oblong, very obscurely ribbed.

On Gunong Tahan to the summit, 7,186 feet elevation.

Distribution. Perak and Gunong Berumbun near Telom.

A single flowering specimen also got on the Padang differs in the thinner leaves in remoter pairs and the flowers just twice as large. A very little-known plant, of which the flowers have never been adequately described.

CAMPANULACEÆ.

*84. *PENTAPHRAGMA GRANDIS*, Ridl. *op. cit.* p. 312. Abundant from Wray's Camp to the Padang in wet shady spots. Endemic. The petals are oblong and retuse, yellowish white; the tube turns purplish within before withering, as it does in *P. Ridleyi*, King.

VACCINIACEÆ.

85. *VACCINIUM SCORTECHINII*, King & Gamble. A shrub with rose-pink flowers. On the ridge by Bukit Bandera and on the top of Gunong Tahan, altitude 7,186 feet. It occurs also in Perak at high elevations. *Vaccinium buxifolium*, Hook. fil., of Kinabalu, is closely allied to this plant; but the leaves of *V. Scortechinii* are rounder and distinctly gland-dotted beneath, and the flowers are pubescent.

*86. *VACCINIUM TEYSMANNI*, Miq.; Ridl. *op. cit.* p. 313. A common shrub on the Padang, in fruit only.

Distribution. Perak and Java.

87. *VACCINIUM KUNSTLERI*, King & Gamble. A shrub in fruit, Gunong Tahan. Not epiphytic here.

Distribution. Perak.

*88. *VACCINIUM PUBICARPUM*, Ridl. *op. cit.* p. 313. A large branching shrub or treelet, very common on the stream-banks in the woods of the Padang. Also collected on K'luang Terbang by Barnes.

*89. *VACCINIUM LONGIBRACTEATUM*, Ridl. *op. cit.* p. 313; *antea*, p. 49. A large bush common on the ridges of the track and the Padang. The original specimens were only in fruit, but I got flowers on this occasion and also received a flowering specimen from Gunong Ulu Kali, Selangor.

The flowers are in axillary pairs, on curved pedicels $\frac{3}{8}$ inch long, covered with short white hairs, as are the calyx and corolla. The calyx-tube is short and broad, campanulate, about $\frac{1}{10}$ inch long; the lobes lanceolate, triangular, acute, all very hairy. The corolla rose-pink, is $\frac{3}{8}$ inch long, cylindric, $\frac{1}{4}$ inch through, with short, recurved, ovate, obtuse lobes, hairy within and without. Stamens 10, included shorter than the tube; filaments slightly dilated at the base, hairy; anthers oblong as long, terminated by two cylindric pale-coloured tubes, truncate with circular openings at the tip; the body of the anther is 4-grooved, pustulate, red; the connective is prolonged from the centre of the anther on the back into a projecting lanceolate flat process. Style long and stout, hairy for most of its length. The fruit is pink when ripe, and sweet, but hard and not worth eating.

The plant has only been obtained on these two mountains, and on Gunong Kerbau 5,000–5,500 feet.

ERICACEÆ.

*90. *PIERIS OVALIFOLIA*, *Don*; *Ridl. op. cit.* p. 313. A large spreading shrub or tree overhanging the streams. Flowers white. On the Padang.

Distribution. Himalayas, Burmah, Perak, Japan.

*91. *RHODODENDRON MALAYANUM*, *Jack*; *Ridl. op. cit.* p. 313. Very common as an epiphyte and also as a terrestrial erect shrub on the ridges above Wray's Camp and on the Padang.

Distribution. Malay Peninsula, and Sumatra.

*92. *RHODODENDRON ELEGANS*, *Ridl. op. cit.* p. 314. Epiphytic on trees in thick woods, below the Gully and also in the Padang woods; not rare, but seldom in flower. The capsule is $\frac{1}{4}$ inch long, the valves lanceolate acute, widest towards the tip and slightly narrowed towards the base, $\frac{1}{8}$ inch wide in the widest part.

This pretty species is most nearly allied to *R. cuneifolium*, Stapf, of Kinabalu.

*93. *RHODODENDRON WRAYI*, var. *MINOR* (*Rhododendron Wrayi*, *Ridley, op. cit.* p. 314). On the Padang and up to the top of Gunong Tahan. The plant is smaller than the typical form of *Wrayi* in every part, the leaves usually distinctly smaller, and the flowers (which, however, were quite withered at the time of our visit) appear to have been not more than half the size. A plant collected in fruit on Telom ridge in the Batang Padang district seems to be the same species.

Distribution. Perak and Selangor.

94. *RHODODENDRON JASMINIFLORUM*, *Hook. fil.* On the camp stream on the Padang and the ridge near Bukit Bandera, just coming into flower at the end of our visit. The form more resembles that of Mount Ophir, both in the shape of the leaves and absence of pink spots in the mouth of the tube. The mouth is, however, tinted with rose-colour.

*95. RHODODENDRON LONGIFLORUM, *Lindl.*; *Ridl. op. cit.* p. 314. At 5,000 to 6,000 feet, collected by Robinson. I did not see this here, but found it at Wray's Camp, at 3,300 feet alt.

Distribution. Perak, Borneo, and Sumatra.

96. DIPLYCOSIA LATIFOLIA, *Bl.* Ridge by the Gully, Gunong Tahan.

Distribution. Perak, Selangor, and Java.

97. DIPLYCOSIA BREVIFLORA, n. sp.

Epiphytic shrub with slender branches, the young parts red with long, appressed, red hairs. Leaves alternate, obovate-obtuse, coriaceous, margins thickened with obscure crenulations, in each of which is a red appressed hair, above rugose (when dry), beneath paler dotted with depressions each containing a hair, nerves 2 pairs, very indistinct, 1 inch long and as wide; petiole $\frac{1}{2}$ inch long, red, hairy. Flowers in axillary pairs. Peduncles stout, rufous, hairy, $\frac{1}{2}$ inch long. Bracts 2, ovate, densely rufous, hairy, appressed to the calyx. Calyx-lobes ovate-acuminate, coriaceous, dark green, margins and apex long, hairy, $\frac{1}{2}$ inch long. Corolla shorter, subglobose, glabrous; lobes 5, triangular, quite obtuse, fleshy. Stamens 10; filaments base broad, flat, thin, narrowed, linear. Anthers orange-coloured, minutely papillose, lanceolate-acuminate; base rounded, bilobed; apex with two flattened, smooth, light yellow processes. Pistil glabrous, conic.

Epiphytic on a tree on the ridge below the Gully. Flowers green. July 15.

98. CLETHRA CANESCENS, *Reinw.* A single specimen obtained on the Padang.

Distribution. Java, Borneo, Celebes, and Lombok. New to the Peninsula.

*99. LEUCOPOGON MALAYANUS, *Jack*; *Ridley, op. cit.* p. 314. A common shrub on the Padang.

Distribution. Tenasserim to Malay Peninsula, Borneo, and Banka.

MYRSINEÆ.

100. MYRSINE PERAKENSIS, *King & Gamble?* A big shrub, with branches only leafy at the ends. Leaves oblong-obtuse, narrowed to the base or rounded, stiffly coriaceous, glabrous, polished above, midrib thick on the back of the leaf, nerves very numerous, fine, and indistinct, 4 to 5 inches long, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches wide. Flowers not seen, fruits in short racemes on persistent thick peduncles, below the leaves very numerous. Pedicels 4-angled, $\frac{1}{2}$ inch long. Sepals 5, ovate, eglandular. Drupe globose, $\frac{1}{2}$ inch long, about 5 fruits on a peduncle $\frac{1}{2}$ inch long, with small ovate bracts.

Common on the Padang. In dry open places the stems are thicker, the leaves shorter, rounded at the base, and more coriaceous.

I have seen no specimen of the type, but I suppose from the description this plant is what is intended by *M. perakensis*.

101. *EMBELIA MYRTILLUS*, Kurz. On tree over the stream at the Ninth Camp.

Distribution. Burmah, Mount Ophir, and Perak Hills.

102. *LABISIA PUMILA*, var. *LANCEOLATA*. A single specimen brought in by a Dyak from the banks of the Teku River.

Distribution. Common all over the Peninsula.

103. *ARDISIA PETRICOLA*, n. sp.

Shrub, branches slender, dark brown; young parts scurfy, ferruginous. Leaves elliptic-obtuse, slightly narrowed to each end, coriaceous; nerves numerous, primary nerves slender, horizontal, parallel, hardly distinguishable from the secondary nerves; leaf above smooth and nerves inconspicuous, beneath nerves visible and whole leaf densely dotted with minute glands, midrib elevated, red, scurfy, 3 inches long, $1\frac{1}{2}$ inch wide; petiole $\frac{1}{4}$ inch long, channelled and winged to the base, red, scurfy. Panicle terminal, dense, 2 inches long, rachis red, scurfy; branches 7 or 8, short, half an inch long, bearing cymes of 3 or 4 flowers. Bracts very small. Calyx 5-lobed; lobes Corolla pink, $\frac{1}{4}$ inch across, tube hardly any; lobes 5, lanceolate acuminate, with large red glands on the tips, lanceolate ovate, obtuse, with numerous red glands on the back Stamens a little shorter ovate, cordate, mucronate, eglandular; filaments short. Style subulate, $\frac{1}{4}$ inch long. Buds acute.

Gunong Tahan, not rare up to 7,186 feet elevation.

Near *A. chrysophyllifolia*, King & Gamble, but the panicles almost invariably terminal (I found one plant with axillary panicles as well), not pubescent; the buds acute and stamens not gland-dotted.

*104. *ARDISIA RETINERVIA*, Ridl. *op. cit.* p. 315. Shrub, fruits black. Endemic.

*105. *ARDISIA BINIFLORA*, Ridl. *op. cit.* p. 314; Common in the Padang woods and thickets. Flowers pink. Drupes red. Endemic.

*106. *ARDISIA ROSEA*, King & Gamble; Ridl. *op. cit.* p. 314; *antea*, p. 50. Common in thickets and open woods on the Padang. Flowers usually nearly white.

Distribution. Hills of Perak and Selangor.

107. *ARDISIA MONTANA*, King & Gamble. A small tree with pink flowers, woods below the Gully.

Distribution. Perak.

108. *ARDISIA LABISIAEFOLIA*, King & Gamble. Small tree with the panicle much more lax and spreading than in the type, in woods on the Padang.

Distribution. Perak.

STYRACEÆ.

109. *SYMPLOCOS PYRIFLORA*, n. sp.

A medium-sized tree. Leaves coriaceous, drying greenish yellow, elliptic-ovate or lanceolate-acuminate, obtuse, margins

undulate, crenate at the apex, base shortly narrowed, 5 inches long, 2 inches wide; midrib elevate beneath; nerves 6 pairs, branched and anastomosing; petiole $\frac{1}{2}$ inch long. Inflorescence of terminal sessile panicles of racemes 2 inches long. Branches pubescent. Bracts caducous. Flowers large, half an inch across, white, fragrant, sessile. Ovary short, obconic. Sepals large, glabrous, ovate or oblong-ovate, obtuse, $\frac{1}{10}$ inch wide, white. Corolla of 4 oblong rounded lobes, shortly joined at the base. Stamens about fifty; filaments as long as the corolla, free to base. Style stout. Stigma capitate. Drupe elliptic, rounded at both ends, sessile, light brown when dry, and crowned by the persistent sepals, $\frac{3}{4}$ inch long, $\frac{3}{8}$ inch through; pericarp corky. Seed not ribbed.

A common tree on the Padang in open woods and on stream-banks.

Near *S. cerasifolia*, Wall., but the flowers are larger, the fruit smaller, and the seed not ribbed. A very handsome tree.

110. SYMPLOCOS (CORDYLOBLASTE) PULCHERRIMA, n. sp.

Symplocos Scortechinii, Ridley, *op. cit.* p. 315.

Small tree; branches dark red, glabrous. Leaves elliptic-lanceolate, obtuse, narrowed to the base, margins crenulate with few long crenulations, coriaceous, glabrous, midrib channelled above, elevate beneath, red, nerves 9 pairs inarching within the margin, main reticulations nearly as prominent, 4 inches long, $1\frac{1}{4}$ inch wide; petiole channelled above, flattened, $\frac{1}{2}$ inch long. Inflorescence axillary, of 1—4 flowers on a short $\frac{1}{2}$ inch peduncle, nodding, glabrous. Bracts and bracteoles linear, very small. Calyx campanulate, $\frac{1}{8}$ inch long, with short rounded-ovate lobes, glabrous except the pubescent tips. Corolla $\frac{3}{8}$ inch long, base tubular; lobes free for $\frac{1}{3}$ their length, oblong-rounded, nearly glabrous with a little silky hair in the centre outside; margins pubescent, white veined with red. Staminal tube silky pubescent within, adnate to the corolla at the base of the lobes; free part of the filaments slender, of various lengths, the tallest little shorter than the corolla-lobes, about 60. Anthers rounded, oblong, four-lobed. Ovary ovoid. Style as long as the corolla-tube, all hairy. Stigma capitate. Fruit oblong, slightly narrowed at the base; apex elevated above the calyx-rim, white, silky, $\frac{1}{2}$ inch long, $\frac{1}{4}$ inch through.

Stream-banks on the Padang and woods on the ridges at Observation Hill. In the previous paper I referred this beautiful shrub to *S. Scortechinii*, King & Gamble, which species I have not seen. It differs, however, from the description in the smaller flowers, stiffer leaves, less hairy corolla, and several other points.

OLEACEÆ.

*111. OLEA CAPITELLATA, *Ridl. op. cit.* p. 317. A shrub with dark green leaves and small yellowish-white flowers. Common on the Padang and the ridges from near Wray's Camp. Endemic.

EBENACEÆ.

112. [MABA ELEGANS, n. sp.]

A small slender tree about 10 feet tall, with drooping branches covered with rather long stiff hairs. Leaves alternate, elliptic-lanceolate, obtuse, narrowed at the base, above glabrous, smooth, beneath the midrib covered with long hairs, nerves invisible, $\frac{1}{2}$ inch long, $\frac{1}{8}$ inch wide, nearly sessile, with a very small petiole. Flowers solitary, sessile or nearly so, on the underside of the branches entirely silky hairy, $\frac{1}{4}$ inch long. Sepals 4, ovate-rounded; tube of corolla elongate bottle-shaped, narrowed upwards; lobes lanceolate-obtuse, 3, hairy outside, glabrous inside. Pistil club-shaped, hairy, shorter than the tube of the calyx. Styles short, thick, glabrous; stigmas subtriangular, toothed, white. Disc hairy. Staminodes filiform, 3, slender, shorter than the pistil. Male flowers not seen.

Kuala Teku woods behind the Camp.

Apparently allied to *M. Beccarii*. Hiern, of Borneo. Altogether the smallest Ebony-tree I know, not much more than a shrub, and with very small leaves and flowers.]

APOCYNACEÆ.

113. ALYXIA ANGUSTIFOLIA, n. sp.

Usually a slender climber in woods, suberect on the open Padang. Stems dark brown. Leaves coriaceous, elliptic-lanceolate, blunt or subacute, glabrous, margin thickened, midrib on the back very thick, channelled above, nerves invisible on both surfaces, 1 to 2 inches long, $\frac{1}{4}$ inch wide, in pairs or whorls of 3; petiole $\frac{1}{8}$ inch long. Flowers in terminal or axillary cymes, half an inch long, about 12 in a cyme; peduncle and pedicels short, scurfy, pubescent, ribbed. Sepals linear or lanceolate-linear, $\frac{1}{8}$ inch long, pubescent. Corolla white, $\frac{1}{4}$ inch long, glabrous; tube slender, cylindric, dilated slightly just below the lobes; lobes short-ovate, obtuse; mouth of tube with a thickened ring inside, below white hairy. Stamens 5; filaments very short; anthers tapering upwards, lanceolate. Style not longer than the anthers, glabrous. Stigma clubbed. Ovary white, villous. Fruit black, elliptic-obovoid, $\frac{1}{4}$ inch long.

Very common on the Padang, and in the woods, one of the very few climbers there.

Allied to *A. pumila*, Hook fil., of Mount Ophir and other parts of the Peninsula, but with very narrow stiffly coriaceous leaves with invisible veins.

ASCLEPIADEÆ.

114. DISCHIDIA ALBIDA, *Griff.* On trees in the Padang. Flowers yellowish white with pink tips to the petals.

Distribution. Malay Peninsula, usually at high elevations.

115. DISCHIDIA COCCINEA, *Griff.*; *Ridl. op. cit.* p. 315. On trees on the Padang at 5,600 feet.

Distribution. Common on the Peninsula at high elevations.

116. *DISCHIDIA CORDIFOLIA*, King & Gamble. The leaves in this plant, as well as in another quite similar collected by W. D. Barnes in K'luang Terbang, are lanceolate and hardly cordate; but I think it is the same as the plant from the Taiping hills, which I take to be the species intended by the authors.

117. [*DISCHIDIA BENGALENSIS*, Colebr. Occurs on the ridges above Wray's Camp, alt. 3,300 feet. It ranges from India to the Malay Islands.]

GENTIANACEÆ.

*118. *GENTIANA MALAYANA*, Ridl. *op. cit.* p. 316. Common on stream-banks on the Padang, and in damp spots, also near Skeat's Camp. The flowers are a pure azure-blue; I once, however, found a pure white one on Gunong Ulu Riang. Endemic.

*119. *CANSCORA TRINERVIA*, Ridl. *op. cit.* p. 316. Common in damp shady places at Wray's Camp 3,000 feet altitude to the Padang woods 5,600 feet. The flowers are pure white, two of the petals are smaller than the others and so closely appressed that at first glance they look like a single one, giving the flower the appearance of a *Sonerila*. Endemic.

120. *CRAWFURDIA BLUMEI*, Don.; *antea*, p. 51. A pretty twiner with yellowish corolla and beautiful pulpy violet fruit. In woods on Observation Hill and the Padang.

Distribution. Java, previously collected by Wray in Pahang. Gunong Kerbau, Perak, 6,600 feet.

LOGANIACEÆ.

*121. *GAERTNERA RAMOSA*, Ridl. *op. cit.* p. 317. Common on the Padang in the woods at 5,000-6,000 feet altitude. Flowers white. Endemic.

*122. [*GAERTNERA LANCEOLATA*, n. sp. (*G. oblanceolata*, Ridl. *op. cit.* p. 317.)

Shrub with a brown woody stem $\frac{1}{2}$ inch through. Leaves elongate, lanceolate-acuminate equally to each end, coriaceous, 7 inches long, 1 inch wide; nerves 7 pairs, upcurved towards the margin, secondary nerves nearly as distinct, reticulations fine, distinct, whole leaf minutely punctate above, dotted beneath; petiole stout, half an inch long, winged to the base. Branch-leaves similar, nearly 2 inches long, $\frac{1}{2}$ inch wide. Stipules tubular, $\frac{1}{2}$ inch long, with 5 or 6 ribs and 5 or 6 setaceous points, usually entire, but often split nearly to the base. Cymes slender, base 3 inches long, with a peduncle half its length; branches few and short, the lowest a quarter of an inch long, two pairs, the rest one-flowered. Rachis minutely pubescent. Bracts, lower ones linear, setaceous, as long as the cymes, upper ones short-ovate, acuminate. Pedicels $\frac{1}{8}$ inch long. Calyx small, cup-shaped, margin entire or nearly so, teeth absent or minute, puberulous. Corolla $\frac{1}{2}$ inch long, white, glabrous, tube as long as the lobes, cylindric, lobes ovate,

oblong, obtuse. Fruit globular, smooth, black, small, supported by the enlarged saucer-like calyx.

Wray's Camp, in bushy spots (*Robinson & Wray*, 5,343; *Ridley*, 16,255) at 3,300 feet.

I have seen no type of *G. oblanceolata*, King & Gamble, but from description I take it that the plant intended is one of much stouter habit and large leaves, with short-panicled cymes shorter than the leaves, which occurs at Maxwell's Hill on the Taiping Range.

In the Tahan plant elongate branches are borne which carry narrow leaves very different from the stem-leaves, and on the ends of the branches are slender, reduced, compound cymes.

Allied to this plant is one from the Semangko Pass and one from Bukit Hitam in Selangor, which I will describe here.]

123. [GAERTNERA DIVERSIFOLIA, n. sp.

Stem woody, stout, $\frac{1}{2}$ inch through, pale brown; stem-leaves thinly coriaceous, elliptic-oblanceolate, acuminate, cuspidate, gradually narrowed to the base, glabrous, nerves conspicuous on both surfaces, 6 to 10 pairs, 11 inches long and 3 inches wide; petiole winged for part of its length, only an inch long, stout. Stipules tubular, half an inch long, with 5 long setaceous teeth. Side-branches 10 inches long, base for 3 or 4 inches bare (a single internode), then 1 to 2 pairs of leaves, distant, terminated by 1 or 2 rather lax-panicled cymes $1\frac{1}{2}$ inch long; leaves 2-3 inches long, $\frac{1}{4}$ - $\frac{1}{2}$ inch wide, lanceolate-acuminate. Stipules shorter and often split. Inflorescence glabrous, of short stout branches, each bearing three flowers, lower branches rebranched. Pedicels very short, $\frac{1}{16}$ inch. Calyx cup-shaped, with five short teeth. Corolla white, $\frac{1}{4}$ inch long; tube cylindric, thick; lobes oblong-obtuse, as long, glabrous outside. Fruit globose, smooth, one-seeded or double globose, 2-seeded, $\frac{1}{4}$ inch long; calyx but little enlarged; seed globular.

Selangor, Bukit Hitam (*Kelsall*, 1,995; *Ridley*, 7,429.)

This plant seems to me to be intermediate between the plant from Maxwell's Hill and the next species. The elongate axillary cymes with a long basal internode and the different-shaped leaves in this branch are absent in the former, while in the general structure of the stem-leaves and the flowers it resembles it.]

124. [GAERTNERA INTERMEDIA, n. sp.

Stem woody, stout. Leaves oblanceolate, abruptly cuspidate, gradually narrowed from the middle to the base, subcoriaceous, nerves 10 pairs, conspicuous and prominent beneath, hardly so above, minutely dotted on both surfaces, 8 inches long, $2\frac{1}{2}$ inches wide; petiole $\frac{1}{4}$ inch long, winged nearly to the base. Stipules tubular with 4 or 5 setaceous points, often splitting in 2 halves. Floriferous branches nearly a foot long, with 4 pairs of leaves, internodes 3 inches long; leaves narrowly lanceolate-acuminate at both ends, smallest ones at the base, 1 inch long, $\frac{1}{8}$ inch wide, upper ones 2 inches

long by $\frac{1}{2}$ inch, upper portion of the branch puberulous. Bracts linear-acuminate at the base of the cyme, ovate-acuminate above. Branches in fruit stout, lowest one half an inch long. Calyx cup-shaped, obscurely 5-lobed; fruit globose.

Selangor, Hulu Semangko (*Ridley*, 12,080)

This plant distinctly connects *G. diversifolia* with *G. lanceolata*, especially in the texture of the leaves and their narrower form and shorter petiole.]

125. [GAERTNERA VIOLASCENS, n. sp

A shrublet with pale brown stems about $\frac{1}{2}$ inch through, the younger branches smooth, purplish. Leaves elongate-lanceolate, acuminate, acute at the tip, gradually narrowed and decurrent on the petiole below, herbaceous, glabrous, with 8 pairs of thin ascending nerves, drying olive-green above, paler beneath, 6 inches long, 1 inch across; petiole slender, 1 inch long. Stipules connate in a ring; lobes free, rounded-ovate, $\frac{1}{2}$ inch long. Peduncle terminal, 2-3 inches long, glabrous, bearing 3 or 4 branches, the lower ones spreading, $\frac{3}{4}$ inch long, upper ones on a longer peduncle. Bracts at the basal pair linear, obtuse, from a broad lanceolate base, half an inch long, green. Cymes 2 or 3 on the end of each branch, of few flowers, sessile. Bracteoles ovate. Calyx campanulate, short, with slight traces of teeth. Corolla dirty violet; tube, cylindric, half an inch long; lobes ovate, subacute, $\frac{1}{2}$ inch long, spreading or reflexed; tube within glabrous, except in the mouth at the point of attachment of the stamens, which is covered with dense white short hair. Stamens 5; filaments very short; anthers linear, obtuse. Style very slender, capillary. Ovary short, oblong, truncate. Fruit ellipsoid, sessile, half an inch long, of 2 pyrenes, each flat with a strong keel on the outer face.

By Wray's Camp. Tahan, at 3,300 feet altitude.

A very distinct plant, with unusually coloured flowers; all other species in the genus which I know have white flowers.]

LENTIBULARIACEÆ.

*126. UTRICULARIA NIGRICAULIS, *Ridl. op. cit.* p. 317.

This was first collected by Mr. Robinson, and described in the 'Journal of the Linnean Society, Botany,' vol. xxxviii. p. 317. I add the following notes about the plant:—

The leaves are narrow and linear, obtuse. The calyx has the upper lobe very obtuse, rounded at the tip and violet in colour, the lower lobe oblong and greenish, much smaller. Upper petals oblong-obtuse, whitish, violet at the base. Lip 3-lobed; lobes nearly equal, middle one a little smaller than the other two, violet with a darker spot at the base. The spur porrect, gibbous at the base, a little longer than the lip, violet. The stems are not always deep-coloured, sometimes being green.

This little plant was very abundant in damp spots on the peaty banks of the streams on the Padang and up the Teku

River; I also found it in a small damp spot on the ridge between Wray's Camp and Skeat's Camp.

127. *UTRICULARIA AUREA*, n. sp.

Leaves several in a tuft, linear, lorate, obtuse, $\frac{1}{8}$ inch long, narrow, bright green. Stem 1 inch to $1\frac{1}{2}$ inch tall, stouter than in the other species, purple, with 2 or 3 distant, bract-like, linear, oblong-obtuse leaves 1 mm. long. Flowers 1 or 2. half an inch long from the tip of the lip to the tip of the spur, Bracts lanceolate-ovate, purplish or yellow. Calyx: upper lobe broad, oblong-obtuse, lower one ovate, rather shorter, obtuse, all yellow. Petals ovate, oblong-obtuse, curved up at the tip, yellow, each with 2 fine brown streaks in the centre. Lip semiorbicular, broad, a quarter of an inch across; apex broad, truncate, with three obscure lobes, two rounded with a narrow tooth in the centre, two raised bars in the centre, and three short brown streaks at the base. Spur thick at the base, horn-shaped, curved, yellow, $\frac{3}{8}$ inch long.

On peaty banks of streams among moss and hepatics on the Padang. Just coming into flower at the time of our visit and not very abundant. This pretty little species has the biggest flowers of the three species here; the whole flower is of a rich orange-yellow with brown streaks on the petals and lip. I do not know any species here at all allied to it.

*128. *UTRICULARIA ANTHROPOPHORA*, n. sp.

Utricularia orbiculata, Ridl. op. cit. p. 318.

Leaves in rosettes, orbicular or obovate, $\frac{1}{10}$ inch across, bright green; petiole $\frac{1}{4}$ inch long. Branches with bladders, axillary, an inch or less long, as thick as the petioles. Bladders distant, elliptic-ovate, with two or three branched processes at the mouth. Stem slender, 2 inches long, pale. Upper sepal ovate, concave, much larger than the small lower one, apex broad, truncate; lower one ovate, very small. Petals linear, oblong-obtuse. Lip $\frac{1}{4}$ inch long, base oblong, apex four-lobed; side-lobes spreading, oblong-obtuse, central pair longer, oblong-obtuse, all violet with a yellow spot at the base. Spur longer, horn-shaped, curved, violet, slender.

Very abundant, and forming tufts over an inch across on rocks, with *Jungermannia* etc. on rocks in streams on the Padang, but only a few flowers met with. The form and size of the lip vary somewhat, but when fully developed it has much the form of that of *Aceras anthropophora*. The leaves somewhat resemble those of *U. orbiculata*, but are more narrowed to the base. This must be the plant recorded as *U. orbiculata* in the previous paper.

GESNERACEÆ.

*129. *ÆSCHYNANTHUS RADICANS*, Jack? In fruit only. Wray's Camp and the Padang.

130. *ÆSCHYNANTHUS* sp. Also in fruit only. A larger species, near *Æ. longiflora*, Dec.

*131. *DIDYMOCARPUS ROBINSONII*, Ridl. *op. cit.* p. 318. Abundant in the Gully. The flowers are rather white streaked with violet and with a yellow blotch in the tube, than purplish streaked with white as originally described. Endemic.

132. *DIDYMOCARPUS (SALICINÆ) FILICIFOLIA*, n. sp.

Stem woody, 3—4 inches long. Leaves crowded at the top, oblong, linear, acuminate, base more or less narrowed, decurrent and obtuse on the petiole, margins bluntly closely serrate, above dark green, beneath whitish, glabrous, midrib and petiole transversely rugose, nerves about 17 pairs, $3\frac{1}{2}$ — $5\frac{1}{2}$ inches long, $\frac{1}{2}$ inch wide or little less; petiole $\frac{1}{8}$ inch long. Peduncles red, scurfy, slender, $1\frac{1}{2}$ —2 inches long, 2—4 flowered. Bracts linear, acuminate, $\frac{1}{8}$ inch long. Calyx-lobes narrow, linear acute, as long. Corolla short, campanulate, curved; lobes ovate, acute, $\frac{1}{4}$ inch long, white. Capsule linear, cylindric, acuminate, half an inch long.

Damp banks of the first Padang stream, local and nearly out of flower.

Closely allied to *D. salicina*, Ridl., of the Tahan River, but differing in its leaf-base which is decurrent on the petiole above, ending in a rounded point, the short petiole, more parallel-sided leaves, and larger white flowers. The wrinkled midrib is very curious.

133. [*DIDYMOCARPUS ERICÆFLORA*, n. sp.]

Stem over a foot tall, $\frac{1}{8}$ inch through, woody, pale glabrous below, red-brown above when dry. Leaves elongate-lanceolate, apex long, acuminate, base narrowed gradually, somewhat inequilateral, glabrous, nerves 16–18 pairs, very inconspicuous, midrib elevated, transversely rugose below, channelled above, 6 inches long, 1 inch wide; petiole $\frac{1}{4}$ inch. The leaves are in slightly unequal-sized opposite pairs. Bracts 2, linear, glabrous. Peduncles $\frac{1}{8}$ inch long, adnate to the petioles. Pedicels erect, slender, $\frac{1}{8}$ inch long, scurfy, pubescent. Flowers in pairs, white. Sepals 5, linear, obtuse, blunt, green, $\frac{1}{8}$ inch long, very narrow, spreading. Corolla $\frac{1}{4}$ inch long, thick, tubular, slightly gibbous, below pubescent, white; lobes very short, $\frac{1}{2}$ inch long, ovate-obtuse, subequal, violet, glabrous within. Stamens 2, very short, less than half the length of the tube; filaments linear, straight; anthers rather large, cordate, obtuse. Style longer, fairly stout, pubescent; ovary angled, tapering slightly upwards. Stigma orbicular. Capsule 1 inch long, cylindric, acuminate at the tip, slightly upcurved, glabrous.

Wray's Camp, Tahan, not common.

The only plant at all allied to this is *D. lilacina*, Ridl., which is common on the Tahan River. It is allied in the connature of the axillary peduncle of the inflorescence to the petiole, in the groove of which it seems to be imbedded. The short broad corolla-tube (somewhat of the shape of a heath flower), the short stamens (of which, however, the anthers are not connivent as in *Parabæa*, but are free and ovate,

not reniform—there are no rudiments of the second pair visible), make the plant very distinct, and these two species may well form a distinct section, if not a genus.]

*134. [DIDYMOCARPUS FLAVOBRUNNEA, var. MONTANA.

Stem woody, 10 inches tall or less, closely covered with short dense hairs. Leaves lanceolate-acuminate, base narrowed and decurrent on the petiole, margin dentate, herbaceous, sprinkled with hairs above, densely velvety hairy beneath, nerves 10 pairs, 6 inches long, 2 inches wide; petiole velvety, $\frac{1}{2}$ inch long. Scape 6 to 10 inches long, velvety, hairy. Flowers 6 or 7, crowded at the tip. Bracts lanceolate-acuminate, long, hairy. Pedicels $\frac{1}{8}$ inch long, hairy. Calyx-lobes lanceolate-acuminate, hairy. Corolla half an inch long; tube cylindric, dilated a little at the top, maroon-red; lobes rounded, $\frac{1}{8}$ inch long, yellow with broad maroon streaks. Capsule linear, acuminate, glabrous, an inch long.

Wray's Camp, at 3,300 feet.

This differs from typical *D. flavobrunnea*, Ridl., of the lower part of the Tahan, in its greater size, more softly woolly leaves, and in the different colouring of the corolla, which is barred with broad bands of red-brown instead of a few streaks.]

135. [DIDYMOCARPUS GRANDIFLORA, n sp.

Stem elongate, a foot long, olive-green, woody, pubescent in the young part. Leaves opposite, in pairs three-quarters of an inch apart, oblanceolate, obovate or lanceolate, 1-2 inches long, obtuse or shortly cuspidate, base cuneate, glabrescent, with a few scattered pale hairs on the upper surface, beneath paler; nerves elevated, 3-4 pairs; petiole half an inch long, hairy. Pedicel $\frac{1}{4}$ inch long, purple, glandular, hairy, axillary from one of the lower leaves. Bracts lanceolate-acuminate. Sepals lanceolate-acuminate, both glandular, hairy, green. Corolla 2 inches long; tube glandular-pubescent, narrowed at the base, then dilate, trumpet-shaped; lobes broad, rounded, all purple; limb over an inch across, irregular, distinctly bilobed; median lobe of the lower lip larger than the side-lobes; a yellow, oblong, two-horned patch on the centre of the mouth of the tube, the rest violet-purple. Stamens 2, white; filaments long, slender, rising from the lower part of the tube to the mouth; anthers connivent. Style slender. Stigma circular.

In forest by the stream below Wray's Camp, Tahan. Rare. I could only find one flowering plant. In habit this certainly suggests a *Chirita* near *C. elata*, but the character of this genus, the bifid stigma, is wanting.]

136. PARABCEA LEUCOCODON, n. sp.

Stem rather stout, woody, simple or often branched, 8 inches to over a foot tall; bark corky white; young parts hairy. Leaves numerous, at the tips of the branches, oblanceolate, narrowed at the base, subacute at the tip, $5\frac{1}{2}$ inches long, 2 inches wide, thick, rather fleshy, dull dark green above,

paler beneath, and hairy glabrous above; nerves ascending, 7 pairs, hairy beneath; petiole short, stout. Flowers 1-4 on pedicels, shorter than the leaves, slender, red, hairy. Bracts lanceolate-acuminate, hairy, narrow. Sepals lanceolate-acuminate, sparsely hairy. Corolla campanulate, pubescent, pure white (very rarely tinted violet), an inch long; lobes ovate, regular, equal, obtuse. Stamens 2; anthers connivent, semi-ovate, white; filaments short, sigmoid. Style longer, curved. Stigma capitate. Capsule $\frac{3}{4}$ inch long, $\frac{1}{10}$ inch through, rather broadly linear and woody.

Very abundant in all the damp woods from the Gully upwards. In one plant on the first Padang stream I found the flowers of a violet colour, the other plants pure white. This fine species is not clearly allied to any other known to me. It is the largest species of the genus known to me, and remarkable for its beautiful white bells.

* 137. *PARABCEA RUBIGINOSA*, *Ridl. op. cit.* p. 319. On dry rock-faces, at Skeat's Camp, and by the Camp stream on the Padang; almost out of flower. Endemic.

* 138. *LOXOCARPUS INCANA*, *R. Br.*; *Ridl. op. cit.* p. 319. In the Gully and on rocks in the Teku at 4,500 feet elevation.

Distribution. Perak, Penang, and Selangor.

Flowers light violet with a darker central ring in the mouth. Stamens yellow at base, tips violet.

* 139. *LOXOCARPUS ANGUSTIFOLIA*, *Ridl. op. cit.* p. 319. On rocks by the Teku at the junction of the Camp stream. Flowers violet, larger than those of *L. semitosta*, *Ridl.* I have specimens of a plant apparently identical collected by Mr. Hullett in Lingga Island.

A P E T A L Æ.

NEPENTHACEÆ.

140. *NEPENTHES SANGUINEA*, *Masters.* A few plants seen on the Padang.

Distribution. Mt. Ophir, Perak, and Selangor hills, Kluang Terbang.

141. *NEPENTHES MACFARLANEI*, *Hemsley, antea*, p. 54. This noble pitcher-plant, easily distinguished by the pubescent lid to the pitcher, is common in the damp mossy woods of the Padang. The pitchers are usually deeply embedded in the thick moss; they vary in colour from apple-green with red-brown slashes to entirely red with darker spots.

It occurs on many of our highest mountains.

* 142. *NEPENTHES GRACILLIMA*, *Ridl. op. cit.* p. 320. Abundant on the Padang. The leaves and stem are usually red or dark purple, and the stem when broken exudes a violet-purple stain. The pitchers vary in colour from green with vertical streaks of fuscous-black to entirely fuscous-black. I found also forms in which there was a distinct white ring round the mouth as in *N. albomarginata*, to which plant

Macfarlane, in the 'Monograph of *Nepenthes*,' says this is allied. Endemic.

* 143. *NEPENTHES SINGALANA*, var. *ALBA*.

Nepenthes Bongso, *Ridl. op. cit.* p. 320.

In the previous paper I referred this plant to *N. Bongso*, Korthals, but Macfarlane in the Monograph published in the 'Pflanzenreich' refers it to *N. Singalana*, Becc., of Singalang Mountain in Sumatra. Beccari figures a pitcher of this plant of very much greater size than any I have seen of the plant on the Tahan Padang, and though he does not appear to have recorded the colour of the pitchers at the time of gathering he gives them as dark purple. The plant is extremely common all over the Padang in the driest and rockiest spots, having a short thick stem deeply imbedded in cracks in the rocks, from which numerous long stems are emitted, which scramble over bushes and often form a very large mass. The pitchers are always very small, about the size of those of *N. gracilis*, and, on the whole, rather larger than those of *N. gracillima*. Usually they are of an ivory-white colour tinted with green at the base, and before opening of a yellow tint, and Mr. Kloss brought in one of a pure canary-yellow. The lid and the upper part of the pitcher within are frequently spotted with circular spots of pure rose-colour, and as the pitcher begins to wither it develops irregular blotches of the usual dull red of the other *Nepenthes*. This colouring is, I think, quite unique in the order of *Nepenthaceæ*. The pitchers usually contained little or no water, being quite dry inside. I found in the liquid, where there was any, the remains of ants and small diptera, and on one occasion a small Rutelid beetle, which was alive and uninjured, but most of the pitchers contained nothing.

BALANOPHORACEÆ.

144. *BALANOPHORA MULTIBRACHIATA*, *Fawc.* Common in the Padang woods up to 6,000 feet, deeply buried in the ground and just coming into flower. This species is common at high altitudes all over the Peninsula.

PIPERACEÆ.

145. *PIPER* sp., near *P. stylosum*, Miq. In the Gully in wet spots. This may be a variety only of *P. stylosum*, but it is certainly not typical, and I have no specimens quite like it in the herbarium, except a similar plant collected on Gunong Kerbau by Mohamed Aniff.

146. *PIPER GYMNOCLADUM*, *De Cand.*, var. This grew with the last species in the Gully. It differs from the plant which is a native of the Taiping hills, and is named by De Candolle *P. gymnocladum*, in its more coriaceous leaves, and may be a distinct species. The *Piperaceæ* of the materials for 'A Flora of the Malay Peninsula' are not yet published.*

*Issued since this paper left the author's hands. C De Candolle, *Journ. Asiat. Soc. Bengal*, lxxv, pt iii, pp. 288-339 (1914).

LORANTHACEÆ.

*147. LORANTHUS PULCHER, DC.; *Ridl. op. cit.* p. 321; *antea*, p. 54. Common on the trees in the Padang.

Distribution. Malay Peninsula.

*148. LORANTHUS LOBBII, *Hook fil.*; *Ridl. op. cit.* p. 321. Common up to about 5,600 feet; the little flowers are rufous-orange.

Distribution. Common at high elevations.

*149. ELYTRANTHE ROBINSONII, Gamble; *Kew Bull.*, 45 (1913). On trees in the Padang woods. Endemic.

150. VISCUM ORIENTALE, *Willd.*? On a tree by the stream on the Padang. I am doubtful about this species.

151. ARCEUTHOBIUM DACRYDII, n. sp.

A small greenish-yellow parasite of *Dacrydium Beccarii*, an inch tall, trichotomously branched; stems obscurely 4-angled, minutely papillose and rugulose; at each node a cup-shaped double bract with two small points. Flowers sessile, 2 to several protruding from this connate bract. Males shortly stalked; sepals 2, ovate, keeled; anther minute, sessile on the sepals. Female ovary elliptic-ovoid, with two ovate subacute sepals at the apex 1 mm. long. Drupe elliptic-ovate, shortly stipitate, crowned with two sepals.

Near the Camp on the Padang. This little parasite kills the branches gradually downwards, eventually apparently killing the bush altogether.

The genus is new to the Peninsula; species occur in the Palæarctic Regions of both Worlds, always parasitic on conifers, usually at least on pine-trees. This species is distinct in its host and the shortly stalked male flower, with two developed sepals and a trace of a third. These sepals are keeled and apparently do not expand.

SANTALACEÆ.

152. HENSLOWIA RIDLEYI, *Gamble, Kew Bulletin*, 201 (1912).

A slender climber, the stems about $\frac{1}{2}$ inch through, leaves elliptic-obtuse to ovate, apex rounded, base rather abruptly narrowed, coriaceous, with 3 parallel nerves running from the base; adult leaves greenish yellow to yellow, young ones red, one inch long by half an inch wide; petiole $\frac{1}{2}$ inch long. Male flowers in short axillary racemes, usually 2 in an axil; peduncle $\frac{1}{2}$ inch long; flowers yellow, 2 or 3 on a raceme, subumbellate at the top, shortly pedicelled. Perianth flat in bud; lobes 4, acute-triangular, connate for nearly half their length, base not cylindric; whole perianth $\frac{1}{10}$ inch across. Stamens 4, adnate to the perianth, lobes near the base; filaments short, flat, linear; anther subglobose, 4-lobed. Rudimentary stigma very small. Female flower solitary, on a very small peduncle, axillary, usually 2 in the axil of a leaf, $\frac{1}{2}$ inch long, red. Perianth-lobes 4 or 5, triangular-acute, with

an equal number of stamens as in the male. Fruit half an inch long, when ripe ellipsoid, narrowed at the base, and crowned at the top by the triangular perianth-lobes, with the stamens, at first red, eventually black. Seed indistinctly 5-ribbed.

Common on the Padang, climbing on bushes, also on Skeat's ridge. Also on Kluang Terbang (*Burnes*) and at the Sempana Mines, Selangor.

The absence of any tube to the male flowers and the rudimentary ovary are very distinctive.

Since writing the description of this Gamble has described it in the Kew Bulletin, and "Materials for a Flora of the Malay Peninsula," Journ. Roy. Asiat. Soc. Bengal, ii. 1912, p. 271, under the name of *H. Ridleyi*.

*153. *HENSLOWIA LOBBIANA*, A.DC. I did not see this on the Padang. Mr. Robinson collected, however, specimens which, I believe, belong to this species.

THYMELEACEÆ.

154. *WIKSTRÆMIA CANDOLLEANA*, Meisn., var. With more ovate, cuspidate, coriaceous leaves and flowers on very short racemes. A somewhat similar, but less xerophytic, form occurs in Gunong Hijau of the Taiping hills. It may be the *W. androsæmifolia*, Lesch., of Java.

It was an abundant shrub on the Padang, known to the Malays as "chandan," and its bast was invaluable for tying. Flowers yellowish green.

PROTEACEÆ.

155. *HELICIA SUFFRUTICOSA*, n. sp.

A shrub or dwarf treelet with pale bark. Leaves lanceolate-acuminate, slightly narrowed at the base and rounded, margins with a few short teeth, coriaceous, glabrous, drying light green, nerves 7 pairs, inconspicuous above, prominent beneath, slender, inarching within the margin, 7 inches long, 3 inches wide; petiole thick, $\frac{1}{4}$ to $\frac{1}{2}$ inch long. geniculate at the apex. Raceme from below the leaves, slender, 6 inches long. Flowers solitary or in pairs, on a short pedicel, $\frac{1}{8}$ inch long, white, about 50. Bracts lanceolate-acuminate, minute. Sepals lanceolate, $\frac{1}{8}$ inch long; base linear, narrow, 1 inch long; stamens 4, elliptic, connective prolonged into a short blunt point. Style 1 inch long. Bracts lanceolate-acute, $\frac{1}{10}$ inch long.

Gunong Tahan, Teku woods. In dense forest by the stream. The smallest species of *Helicia* I have seen. Plants under 2 feet tall seemed to be adult.

LAURINEÆ.

156. *CINNAMOMUM MOLLISSIMUM*, Hook fil. Teku woods. Gunong Tahan.

Distribution. Penang and Perak.

October, 1915.

*157. *DEHAASIA LANCIFOLIA*, Ridl. A common shrub or tree in the open woods and stream-banks of the Padang. Endemic.

158. *ACTINODAPHNE PRUINOSA*, Nees. This plant differs from *A. pruinosa* of the Penang hills in having the leaves rounded at the base.

A shrub on the Padang.

Distribution. Singapore, Penang, and Perak.

159. *ACTINODAPHNE* sp. A tree with grey bark; leaves shining above, glaucous beneath and glabrous, with seven pairs of nerves strongly elevate and red beneath, margin strongly thickened, transverse nerves horizontal, 11 inches long, 6 inches wide; petiole 1 inch; cluster of fruit half an inch across; peduncle thick, $\frac{1}{2}$ inch long, red, hairy. Drupe subglobose, $\frac{1}{4}$ inch long.

Dense woods on the Teku River (No. 16,125).

160. *LINDERA STRICTA*, n. sp.

A shrub with dark purplish bark. Leaves coriaceous, shining above, glaucescent beneath, lanceolate-acuminate, acute, base rounded, 3-4 inches long, 1 inch wide, 10-nerved, nerves fine, reticulations conspicuous on both surfaces; petiole thick, $\frac{1}{2}$ inch long, young leaves pubescent. Male flowers on axillary peduncles, $\frac{3}{8}$ inch long. Bud globose. Outer bracts orbicular, imbricate, coriaceous, 4, margins ciliate, inner ones thinner. Flowers in a head; pedicels silky, thick, $\frac{1}{10}$ inch long. Perianth-lobes 6 as long, oblong, linear, obtuse, silky. Stamens 9; filaments short, narrowed upwards. Anthers truncate, oblong, opening introrsely by valves, dehiscing below. Staminodes 6, adnate, in pairs to 3 of the stamens, shorter, apex yellow as of an abortive anther. Rudimentary pistil cylindric, short, obtuse. Female flowers too young. Fruit globose, $\frac{1}{2}$ inch through, black. Peduncle $\frac{1}{4}$ inch, somewhat thickened, dilated above into a short cup.

Gunong Tahan. Common on the Padang. An elegant bush with very erect leaves.

161. *LINDERA MONTANA*, n. sp.

Shrub. Leaves lanceolate-obtuse, shortly narrowed at base, coriaceous above, finely reticulate beneath, reticulations obscure, glaucous, 3-3 $\frac{1}{2}$ inches long, 1-1 $\frac{1}{2}$ inch wide; nerves fine, 4 pairs; petiole $\frac{1}{4}$ inch long, rather thick. Capitula globular, $\frac{1}{2}$ inch long, in pairs on extra axillary peduncles, $\frac{1}{2}$ inch long, on pedicels as long. Bracts 4, orbicular boat-shaped, ciliate at the edges. Flowers 5, on stout pedicels. Perianth-lobes short-oblong, quadrate, truncate, dotted. Stamens 7, fertile, as long; filament short, slender; anther wide-oblong, 2-celled; connective prolonged, rounded. Staminodes several, irregular. Fruit 2 or 3 together, pedicelled on a short peduncle. Pedicels stout, $\frac{1}{4}$ inch long, pubescent. Perianth cup-shaped, $\frac{1}{2}$ inch long and as wide, shallow, entire, margins pubescent. Drupe oblong-ovoid, $\frac{3}{8}$ inch long, black.

Ridges above Wray's Camp, in flower, in fruit on the Padang.

162. *LINDERA CINNAMOMEA*, n. sp.

A branching tree. Leaves coriaceous, ovate-acuminate, base narrowed, above dark green polished (brown when dry), beneath glaucous, sub-trinerved, the midrib and two ascending spreading nerves being connate at the base for 1 inch from the leaf-base, above is another pair, the reticulations very fine and conspicuous, 4 inches long, 2 inches wide; petiole $\frac{1}{2}$ to $\frac{3}{4}$ inch long. Inflorescence $\frac{1}{2}$ inch long, dense, sessile. Bracts ovate-obtuse, minute, hairy. Capitula very small, 3 or 4 together, outer bracts 4, imbricate, orbicular, hairy on the edges. Flowers 4, shortly pedicelled; pedicels silky, hairy. Perianth-lobes 4, oblong-ovate, hairy. Stamens 6; filament as long as the anther; anther extrorse. Fruit ellipsoid, acuminate, $\frac{1}{2}$ inch long, $\frac{1}{8}$ inch through; pedicel $\frac{1}{8}$ inch long, stout.

In woods on a stream near the base of Gunong Tahan and Gunong Ulu Riang (No. 16,124).

*163. *LINDERA* sp. A shrub, quite glabrous except the flowers, with coriaceous leaves, white beneath, three-nerved. This was referred by me to *L. casia*, Nees, but is certainly not that species as named by Gamble. It resembles *L. rufa*, Gamble, but is glabrous and has not acuminate leaves.

Common on the Padang.

164. *LITSEA* sp. A big tree with ovate leaves, glaucous beneath, and large globose bright red fruits like cherries.

Dense woods on the Teku at 4,600 feet.

The part of the flora dealing with the Laurineæ has recently been published, and many of the previous species also described by Mr. Gamble in the 'Kew Bulletin.' None of the above described species appear to be therein described, nor can I elsewhere find any description to suit them.

EUPHORBIACEÆ.

*165. *CHORIOPHYLLUM MONTANUM*, *Ridl. op. cit.* p. 322. A shrub with dull red capsules. Common on the Padang. I could find no flowers. Endemic.

MYRICACEÆ.

*166. *MYRICA FARQUHARIANA*, *Wall.*; *Ridl. op. cit.* p. 322. I only saw seedling plants of this in the Teku and other woods on the Padang. Mr. Robinson got complete specimens on the previous expedition.

Distribution. Indo-Malaya.

CUPULIFERÆ.

*167. *QUERCUS RASSA*, *Miq.*; *Ridl. op. cit.* p. 322. Collected by Mr. Robinson at 6,000 feet. I did not see any plants of it, but saw fallen fruits in the Teku woods.

Distribution. Malay Peninsula and islands.

MONOCOTYLEDONS.

ORCHIDACEÆ.

*168. *OBERONIA CONDENSATA*, *Ridl. op. cit.* p. 322. Epiphytic on trees by streams on the Padang. The stem is remarkable, being long and bare of leaves below and clinging to the bark by numerous roots. The flowers are yellow. Endemic.

*169. *PLATYCLINIS GRACILIS*, *Hook. fil. Ridl. op. cit.* p. 323. In woods on the Padang. Epiphytic, very fragrant. *Distribution.* Perak and Borneo.

170. *PLATYCLINIS LINEARIFOLIA*, *Ridl.* Very common all over the rocks in all parts of the Padang exposed to full sun. The bright orange pseudobulbs and bright yellow flowers make it quite attractive. This was accidentally named *P. Kingii* in the previous paper.

Distribution. Mt. Ophir, and Batang Padang and Gunong Bubu in Perak.

*171. *DENDROBIUM LONGIPES*, *Hook. fil.; Ridl. op. cit.* p. 323. On the top of Gunong Tahan and Ulu Riang.

Distribution. Ulu Batang Padang, Gunong Semangkok and Gunong Kerbau, 6000—6,600 feet.

172. *DENDROBIUM MACROPODUM*, *Hook. fil.* On trees in the woods by the Camp stream.

Distribution. K'luang Terbang and the Larut Hills.

173. *DENDROBIUM GEMINATUM*, *Hook. fil.* Rather scarce on the Padang.

Distribution. Perak and Kedah at 4,000 to 5,000 feet altitude, also Java.

*174. *DENDROBIUM KELSALLI*, *Ridl. op. cit.* p. 323. On trees on the Padang. I did not see flowers of this plant, which was scarce, and so am not quite sure as to the identification.

*175. *DENDROBIUM* sp., near *D. GRACILE*, *Lindl.* Collected by Robinson on the previous occasion; I could not find it again.

*176. *DENDROBIUM UNIFLORUM*, *Griff. op. cit.* p. 323. Collected by Robinson at 5,000 to 6,000 feet altitude. On the Padang.

Distribution. Mt. Ophir and the Larut Hills.

*177. *DENDROBIUM RUPICOLUM*, n. sp.

Dendrobium bifarium, *Ridley, op. cit.* p. 324.

Stems six inches to a foot tall, erect, $\frac{1}{8}$ inch through, slightly undulate, the internodes $\frac{1}{8}$ inch long. Leaves $\frac{1}{2}$ to nearly $\frac{1}{2}$ inch long, oblong-obtuse, obliquely bifid at the tip and slightly dilated at the base, rather fleshy and bright green. Flowers solitary, $\frac{1}{4}$ inch across; ovary and pedicel very short. Sepals oblong-lanceolate, pale ochreous-brown. Mentum very short and blunt. Petals smaller than the sepals, and narrower, 3 nerved. Lip white or light yellow with a darker

central mealy blotch in the centre; claw linear, oblong; limb abruptly suborbicular, deeply retuse. Column short, with short tooth-like stielidia.

Common on rocks and trees on the Padang. I have the same plant from Bukit Hitam in Selangor collected by Kelsall, and from Kluang Terbang in Pahang (with leaves a little longer and thinner) by Barnes. This might be but an alpine form of *D. bifarium*, to which I previously referred it; but the leaves are only half as big as in that species, as are the very small flowers, and the colouring is different.

178. *DENDROBIUM SINUATUM*, var. An elongate form, bigger than usual. On the Padang, not common. A similar plant was obtained in Kluang Terbang by Barnes. It is a foot long, with leaves 1 inch long and $\frac{1}{2}$ inch wide.

*179. *DENDROBIUM CORNUTUM*, *Hook. fil.; Ridl. op. cit.* p. 324. This beautiful plant with its bright pink flowers is abundant on mossy trees from below the Gully to the Padang. It seems to prefer the cold, damp, and dark woods, draped in moss.

Distribution. Perak.

*180. *DENDROBIUM SUBFLAVIDUM*, *Ridl. op. cit.* p. 324. Common on the trees from Wray's Camp to the Padang, but less abundant above 5,000 feet. Endemic.

181. *DENDROBIUM HYMENOPTERUM*, *Hook. fil.* Common on the stems of trees in the woods by the streams on the Padang and by the Teku.

Distribution. Kluang Terbang, Perak Hills, Kedah Peak, and Lankawi.

*182. *BULBOPHYLLUM GALBINUM*, *Ridl. op. cit.* p. 324. Common in the woods of the Teku and Padang to 5,000 feet altitude.

Distribution. Mountains of Perak and Selangor.

183. *BULBOPHYLLUM MICROGLOSSUM*, *Ridl. op. cit.* p. 325. Common in the woods from below the Gully to the Padang. Endemic.

184. *BULBOPHYLLUM TITANIA*, *Ridl. op. cit.* p. 325. On trees on the Padang. Endemic.

185. *BULBOPHYLLUM (MONANTHA-PARVA) DRYAS*, n. sp.

Rhizome very long and slender; no pseudobulbs. Leaves half an inch apart, ovate, fleshy, rugose, reddish in colour, covered with short black hairs, $\frac{1}{2}$ inch long, $\frac{3}{8}$ inch wide. Peduncle slender, filiform, an inch long, with a single appressed sheathing-leaf below. Bract amplexicaul, cup-shaped. Pedicel $\frac{1}{2}$ inch long. Flower solitary. Sepals elliptic-ovate, obtuse, $\frac{1}{2}$ inch long, primrose-yellow. Petals similar, but only half as long, paler. Lip oblong-ovate, obtuse, rather broad, as long as the petals, flattened, dull red with paler edges, and two low keels on the centre. Column whitish broad with broad, rounded, short stielidia.

A single plant was brought in by one of the Dyaks from the Teku woods. It is a very distinct species of the section in its distant leaves with no pseudobulbs (looking like those of a *Dischidia*) and large flower.

186. *BULBOPHYLLUM* (*MONANTHA-PARVA*) PAN, n. sp.

Rhizome short, corky, white; pseudobulbs conic, rugose, purplish, $\frac{1}{2}$ an inch long. Leaf $1\frac{1}{2}$ to 2 inches long, $\frac{1}{4}$ inch wide, oblanceolate and acute; base narrowed to the petiole. Peduncle filiform, 3 inches long, with one sheathing-leaf, red. Flower solitary. Sepals over half an inch long, oblong-obtuse, red, striped with darker colour. Petals a quarter of the length of the sepals, oblong, the margins denticulate, whitish, tipped with black. Lip broad, short, flat, fleshy, blunt, tongue-shaped, grooved down the centre, base greenish, the larger part deep purple, nearly black. Column whitish, stout, with rather long curved slender stelia.

Not rare on trees in dense woods on the Camp stream, Padang.

Perhaps nearest to *B. tenerum*, Ridl., but not hairy.

187. *BULBOPHYLLUM* *CAPITATUM*, Lindl. Common on trees on the Padang. Flowers light yellow or orange. Petals broader and larger than usual, oblong, rounded at the tip.

Distribution. Malay Peninsula and islands.

188. *BULBOPHYLLUM* *MUSCIFERUM*, n. sp.

Rhizome short, 2 inches long, with many roots; pseudobulbs oblong-conic, half an inch long, approximate or shortly separate. Leaf coriaceous, oblanceolate to linear-lanceolate, obtuse or subacute, 2 to 5 inches long, $\frac{1}{4}$ to $\frac{1}{2}$ inch wide, narrowed into a petiole from $\frac{1}{4}$ to 1 inch long. Scapes slender, 12 inches long, with two lanceolate, cuspidate, convolute sheaths; raceme deflexed, an inch long, dense with numerous closely appressed flowers. Bracts triangular, lanceolate-acuminate below, ovate-acuminate above, longer than the very short ovary. Flowers $\frac{1}{2}$ inch long. Upper sepal lanceolate-cuspidate, purple with darker stripes and minute spots, hairy. Lower sepals deflexed, as large, slightly oblique, the internal edge whitish, outer red-purple. Petals $\frac{1}{2}$ of the length of the upper sepal, lanceolate, fleshy-white tipped with a tuft of black hairs, and the edge denticulate, ciliate. Lip fleshy, cordate, lanceolate, base deeply emarginate, with a central groove on the surface, yellow; claw reflexed on the underside, purple. Column very short and broad with a moderately long purple foot. Stelia short, oblong, bifid. Anther-cap flat, ovate.

Gunong Tahan on trees, in forests up to 7,000 feet.

This species is allied to *B. alcorni*, Par., from which it differs in its denser spike, remarkable petals, and the shape of the lip. The extraordinary little flowers resemble a number of small flies perched on a stalk.

189. *BULBOPHYLLUM (CIRRHOPE TALUM) SKEATIANUM*, n. sp.

Pseudobulbs several together in a small clump, obpyriform, rugose transversely, 1 inch long, purple. Leaf linear, lanceolate, obtuse, narrowed to the base, coriaceous, 1 to 2 inches long, $\frac{1}{4}$ to $\frac{3}{8}$ inch wide. Peduncle 5 inches long or less, slender, purple. Bracts linear, acuminate, very small. Flowers 9 to 12 in a half whorl; pedicels 1 inch long. Upper sepal ovate-obtuse, dark purplish red with red streaks; lower sepals bright red to orange-red, half an inch long, linear, acuminate, connate towards the apex. Petals ovate-obtuse, deep red-purple, quite glabrous, as long as the upper sepal. Lip bright orange, tongue-shaped.

This charming little species is distinct in its broad sepals and petals all blunt, and the latter without the hairs usually found in *Cirrhopetalum*.

On bare branches of trees on exposed rocky spots at Skeat's Camp, and also on the Padang on trees by the stream and in open woods on the side of the Teku. I am pleased to associate it with the name of W. W. Skeat, who first ascended the ridge as far as the spot named Skeat's Camp, where I first found this pretty plant.

190. *DENDROCHILUM ANGUSTIFOLIUM*, *Ridl.* On the summit of Gunong Tahan.

Distribution. Selangor Mountains, Bukit Hitam, and Kluang Terbang.

*191. *ERIA NUTANS*, *Lindl.*; *Ridl. op. cit.* p. 326. Gunong Tahan, 6,000 feet (*Robinson*), also found by me at Wray's Camp.

Distribution. Whole Peninsula, common in the low country.

*192. *ERIA CARUNCULATA*, *Ridl. op. cit.* p. 326. Gunong Tahan, 5,000 to 6,000 feet (*Robinson*). Not seen on this occasion. Endemic.

*193. *ERIA LONGIFOLIA*, *Hock. fil.*; *Ridl. op. cit.* p. 326. Gunong Tahan, 5,000 to 6,000 feet (*Robinson*). Not seen on this occasion.

Distribution. Hills of the Malay Peninsula.

194. *ERIA TAHANENSIS*, n. sp.

Stems erect, a foot tall, $\frac{1}{4}$ inch through, leafy, somewhat dilate at the base. Leaves coriaceous, linear, acuminate, 4 inches long, $\frac{1}{4}$ inch wide; sheaths 1 inch long, slightly flattened. Scapes terminal, 2-3, slender, many-flowered, laxly racemose, 8 inches long; rhachis white, woolly. Bracts lanceolate-acuminate, caudate, persistent, $\frac{1}{10}$ inch long. Ovary and pedicel slender, woolly, $\frac{1}{4}$ inch long. Perianth 1 inch long. Upper sepal ovate-lanceolate, woolly outside; lower sepals much broader, triangular-ovate, woolly outside. Mentum short, broad, half as long as the sepal. Petals oblong, thin, glabrous, obtuse, as broad as the upper sepal. Lip three-lobed; side-lobes from the base long, oblong, obtuse, thin; disc

narrow, fleshy; mid-lobe transversely oblong at the base of the lip; one erect rounded callus, with a smaller similarly shaped one on each side, between these a nerve elevated runs along each of the side-lobes; the narrow linear fleshy disc runs to the end of the middle, ending in an irregular, thick, fleshy, oblong rounded callus. Column, free part short, broad, with rounded stelidia.

Gunong Tahan, on trees in woods, 5,600 to 6,000 feet altitude. Endemic.

Allied to *E. bidens*, Ridl., and *E. iridifolia*, Hook. fil., but with a very different lip.

195. *ERIA EARINE*, n. sp.

Stems terete, 2 inches tall, fleshy, covered with papery sheaths; leaves at the lip only, 3-4, oblong, linear, fleshy, 2 inches long, $\frac{1}{4}$ inch wide, acute, light green. Racemes 1-2, erect, slender from the upper axils, 5 inches long, base nude, woolly, pubescent, red, with a few very small ovate bracts. Flowers very numerous, small, white. Bracts ovate, truncate or obtuse, persistent, red, woolly, $\frac{1}{10}$ inch long. Ovary and pedicel longer, cylindric, woolly, red. Sepals, upper one ovate-oblong, laterals bluntly triangular; mentum nearly as long as the ovary, all pubescent, white. Petals linear, oblong, nearly as long as the upper sepal. Lip shorter than the sepals, spatulate, apex rounded-triangular; two short, linear oblong, erect lobes at the base. Column broad, as long as its foot, purple with a very large, triangular, ovate stigma. Anther-cap broad. Rostellum short, but distinct. Capsule $\frac{1}{10}$ inch long, oblong.

On a tree on the Padang, rare.

Perhaps nearest to *E. Rimanni*, Rchb. fil., but remarkable for its very small white flowers in a strict spike. A very pretty little plant.

*196. *ERIA FEROX*, Bl.; Ridl. *op. cit.* p. 326. Common on the Padang.

Distribution. Mountains of the Peninsula, Java, and Borneo.

197. *ERIA POCULATA*, Ridl. On trees on the Padang. Common.

Distribution. Mt. Ophir, Larut Hills, and Kedah Peak.

198. *ERIA MONTICOLA*, Hook. fil. On trees on the Padang.

Distribution. Mt. Ophir, Pulau Aur, Selangor, and Perak Hills.

199. *ERIA TERETIFOLIA*, Griff.; Ridl. *op. cit.* p. 326. On trees by the Camp, 5,600 feet elevation.

Distribution. Mountains of the Peninsula and Borneo.

*200. *ERIA SCORTECHINII*, Hook. fil.; Ridl. *op. cit.* p. 327; *antea*, p. 55. On the Padang. Common.

Distribution. Mountains of the Peninsula.

*201. *ERIA CRASSIPES*, Ridl. *op. cit.* p. 327. On low bushes or terrestrial, Padang. Common. Endemic.

202. *ERIA LORIFOLIA*, *Ridl.* Not common, on trees on the Padang.

Distribution. Kedah Peak.

Flowers yellowish white; petals purple at the base; lip obscurely three-lobed at the tip, with a large rounded central lobe.

203. *TYLOSTYLIS PULCHELLA*, *Bl.* On bare rocks on the Padang. Scarce. The whole plant yellow.

Common all over the Peninsula and Java.

204. *PHREATIA CRASSIFOLIA*, *Ridl.* Very common on trees in the woods everywhere.

Distribution. Mountains of the Peninsula.

*205. *PHREATIA LISTROPHORA*, *Ridl. op. cit.* p. 327. Woods of the Padang, on the highest parts of Gunong Ulu Riang and Gunong Tahan.

Distribution. Perak hills and Lankawi.

206. *CERATOSTYLIS GRACILIS*, *Bl.*; *Ridl. op. cit.* p. 327. On bare rocks on the Padang, an erect tufted form with fleshy thick yellow stems and leaf; in the damp dark woods of the Teku River, long, slender, pendulous, and green stems.

Distribution. Whole Peninsula and Java.

*207. *TAINIA SPECIOSA*, *Bl. Ridl. op. cit.* p. 328. Common at Wray's Camp, rarer in the Padang woods.

Distribution. Mountains of the Peninsula and Java.

*208. *TAINIA VEGETISSIMA*, *Ridl. op. cit.* p. 328. From Wray's Camp to the Padang woods. Endemic.

*209. *SPATHOGLOTTIS AUREA*, *Lindl.*; *Ridl. op. cit.* p. 328. Open places in the Padang and also in the thinner woods.

Distribution. All mountains of the Peninsula and Borneo.

*210. *ARUNDINA SPECIOSA*, *Bl.*; *Ridl. op. cit.* p. 328 *antea*, p. 56. Rather scarce on the Padang and local; a fine dark-coloured form. Abundant on the gravel banks in the Tahan River.

Distribution. India, the Malay Peninsula, and Java.

211. *CALANTHE VERATRIFOLIA*, *Br.?* A single plant in fruit, found in the Teku woods at 4,600 feet altitude, may belong to this species.

212. *DILOCHIA CANTLEYI*, *Ridl.*

Very abundant and conspicuous all over the Padang, and also in the thicker forest. The form on the open rocks is usually about 2 feet high; the stems terete, purple; the leaves rather close-set, ovate-acuminate, suberect, coriaceous, green edged with purple, $1\frac{1}{2}$ inches long, 1 inch wide; in the forests it is taller, as much as 8 feet high; the leaves longer, rather more distant, and thinner in texture. The uppermost leaves are bractlike, ovate, cymbiform, pink, purple, or white. The racemes from 3 to 9, often branched and 3 inches or more long. The floral bracts boat-shaped, white, reddish or pink; pedicels purple. The petals and sepals creamy-white. The

lip oblong, half an inch long, with short rounded lobes, apex truncate, five elevated veins on the centre, dull purplish pink with a cream edge or darker purple with a yellow edge. Column yellowish striped with pink. The buds pink. The fruit globose to ovoid, pendulous, green, with a broad purple bar over each fertile segment and a narrower one between each; it is as big as a small gooseberry.

The plant is always terrestrial. It does not appear to have been met with outside the Malay Peninsula, where it occurs on Gunong Bubu, Gunong Inas, and Gunong Ulu Kali.

I am quite unable to guess why Reichenbach put this very distinct and peculiar genus under *Arundina*, from which it differs in habit, foliage, inflorescence, form of the lip, and most notably, in its three anthers and peculiar dehiscence of the fruit.

*213. *CÆLOGYNE DAYANA*, var. *MASSANGEANA*.

Cælogyne cymbidioides, Ridl. op. cit. p. 329.

Very abundant on the trees overhanging the streams of the Padang and the Teku River, and also in the Gully. The plant described by me as *C. cymbidioides* (Journ. Linn. Soc., Bot. xxxviii. p. 329) is a rather odd form, which was terrestrial, but is obviously an abnormal condition. The plants here were very fine, the pendent sprays of flowers reaching four feet in length.

214. *CÆLOGYNE LONGIBRACTEATA*, Hook. *fil.* A single specimen, identical with the plant of the Sempang Mines, was brought in by the men from the ridge between Wray's Camp and the Padang.

215. *CÆLOGYNE* (§ *SPECIOSÆ*) *XANTHOGLOSSA*, n. sp.

Rhizome stout, woody; pseudobulbs conic, four-angled, $1\frac{1}{2}$ inches long. Leaves solitary, oblanceolate-acuminate, long-petioled, 5-nerved, 7 inches long, nearly 2 inches wide; petiole 2 inches long. Raceme 2 inches, 1-2-flowered; peduncle stout, $1\frac{1}{2}$ inch long. Bract lanceolate-acuminate, $1\frac{1}{2}$ inch long. Pedicel very short; ovary 6-winged, short. Sepals lanceolate-acute, keeled, 2 inches long, pinkish, whiter at the base. Petals very narrow, linear acute, nearly as long. Lip 3-lobed; side-lobe oblong, 1 inch long; mid-lobe lanceolate, edges crisped, acute; keels from the base, 3, low, edge crisped, median one lowest, not hairy, canary-yellow; keels orange; centre of mid-lobe orange, margins pinkish. Column very stout, white; margin of clinandrium rounded; wings large, rounded. Anther large, half an inch long, ovate-obtuse, pale yellow. Pollinia pyriform, large, yellow. Rostellum large, ovate, entire. Stigma deep and wide with a distinct lip.

Woods on the Padang. A single plant brought in by the Dyaks.

Perhaps most closely allied to *C. Rumphii*, Lindl., very distinct in its yellow lip, with 3 low keels, the central one of which runs to the tip, the others half down the lip.

216. *CÆLOGYNE XYREKES*, n. sp.

Pseudobulbs crowded on a stout rhizome, oblong, 4-angled, 2 inches long, top truncate. Leaves obovate-oblong to lanceolate, apex subacute, base narrowed for a long way, nerves 5, distinct, 9 inches long by 3 inches wide. Raceme 3 inches long, from the axil of the young leaf, 2-3-flowered. Bract lanceolate, 2 inches long; ovary and pedicel half an inch long. Upper sepal keeled, 2 inches long, $\frac{1}{2}$ inch wide, lanceolate, pinkish. Petals narrow, linear, $1\frac{1}{2}$ inch wide. Lip a little shorter than the sepal, distinctly three-lobed; lateral lobes rounded; mid-lobe half an inch long, oblong, rounded at the tip, rather narrowed; keels two, low, not hairy, deep brown; base of mid-lobe sepia-brown, edged with flesh-colour; side-lobes dark brown spotted with white. Column long; clinandrium longer than the anther, ovate, yellow. Rostellum lanceolate.

Teku woods below the Padang.

Allied to *C. speciosa*, Lindl., but with no hairs on the lip, the edges entire and mid-lobe smaller.

*217. *CÆLOGYNE CARNEA*, Hook. fil.; Ridl. op. cit. p. 329, ante, p. 58. Common on the Padang. Creeping in moss or over stumps or low bushes. Flowers white, the two central keels yellow.

Distribution. Selangor and Perak Hills (Gunong Kerbau).

*218. *CÆLOGYNE STENOCHILA*, Hook. fil.; Ridl. op. cit. p. 329. Common with the last and more abundant. Flowers brownish flesh-colour.

Distribution. Selangor and Perak Hills.

*219. *PHOLIDOTA PARVIFLORA*, Hook. fil.; Ridl. op. cit. p. 329. Top of Gunong Tahan and elsewhere high up on the Padang.

Distribution. Perak Hills.

220. *PHOLIDOTA ELIZABETHIANA*, n. sp.

Rhizome long, 6 inches or more. Pseudobulbs elongate, cylindric, blunt at the top, closely approximate and appressed to the rhizome, 2 inches long, $\frac{1}{4}$ inch wide. Leaves 2, linear, acuminate at both ends, apex shortly acuminate, acute, mucronate, narrowed gradually to the base, 3-nerved, thinly coriaceous, 9 inches long, $\frac{1}{4}$ inch wide. Scapes from the centre of the leaves of the young bulb, 4 or 5 inches long, graceful, erect; base about an inch, nude; raceme many-flowered; flowers distichous, white, small; rachis straight. Bracts lanceolate-acute, papery, $\frac{1}{8}$ inch long, longer than the flower-buds, caducous before the opening of the flower. Ovary and pedicel $\frac{1}{10}$ inch long. Upper sepal lanceolate, base gibbous, keeled. Petals oblong or ovate-oblong, shorter and thinner. Lip at the base cymbiform with short blunt lobes; mid-lobe broad, suborbicular, obscurely 3-lobed; margins crisp; disc thickened with two elevated, semilunar, fleshy ridges between the two side-lobes; centre of middle lobe thickened. Column short and broad; stelidia short, distinct, tooth-like; rostellum

broad, rounded, entire. Anther wide, rounded, flat; apex rounded. Pollinia pyriform.

Gunong Tahan at 7,100 feet and Gunong Ulu Riang at 6,000 feet.

A pretty plant, remarkable for its narrow grassy leaves and close-set, small, white flowers.

221. *CYMBIDIUM* sp. A terrestrial plant growing on quartz rocks at 7,100 feet on Gunong Tahan, tufted; the roots hick, white, and corky. Leaves linear, lorate, blunt, keeled, 8 inches long to half an inch wide, coriaceous, the sheathing portion an inch long. Scape erect, nodding, 9 inches tall, covered with acuminate sheaths; raceme apparently few-flowered. Fruit large, ellipsoid, 2 inches long, with the persistent remains of the column. Apparently allied to *C. Finlaysonianum*, Wall.

222. *BROMHEADIA PUNGENS*, *Ridl.* On rocks near the Camp on the Padang. Rare and out of flower.

Distribution. Mt. Ophir.

223. *BROMHEADIA RUPESTRIS*, *Ridl.* This beautiful plant was common on the ridges above Wray's Camp up to the Padang, where however it was scarcer. The flowers are firmer in texture than in most of the genus. The sepals and petals were acute, cream-colour, the sepals tinted red on the back. The lip had long narrow lobes curved outwards at the tip; the mid-lobe oblong, the sides at the tip curved over to form a point. The lip is white, the sides and lobes spotted and streaked with purple. The column has the base white spotted with pink, the middle deep pink, and the apex yellow. The anther-cap is small, cap-shaped; pollinia globose with a crescent-shaped gland. The rostellum has two short incurved points and the stigma is large, transversely elliptic.

It also occurs on Mt. Ophir.

224. *SACCOLABIUM BIGIBBUM*, *Hook. fil.* On trees at the stream at the Ninth Camp. Not common.

Distribution. Perak hills and Kluang Terbang, also Burmah.

225. *SARCOCHILUS CRASSIFOLIUS*, n. sp.

Stem 6 inches tall, with 6 very fleshy leaves crowded at the top, elliptic, broadly bilobed, lobes rounded, very unequal, dark green, strongly keeled, $1\frac{1}{2}$ inch long, 1 inch wide. Racemes short, thick, an inch long; rachis slightly flattened, green; bracts ovate, acute, flattened. Pedicels very short. Flower small, white. Sepals ovate-acute, greenish white, the upper one lanceolate. Petals lanceolate, obtuse, a little smaller. Lip pure white; side-lobes short, erect, subtriangular; mid-lobe none; spur broadly rounded, fleshy, with a bright brown blotch and a few in the mouth. Column short and broad, subtriangular, white.

On trees on the stream by the Ninth Camp. Rare. Allied to the next species, but with very different leaves and a shorter rounder flower.

226. *SARCOCHILUS VIOLACEUS*, n. sp.

Stem broad, flattened, 3 inches long. Leaves lorate, keeled, apex unequally bilobed, tips rounded, short, blunt, thickly coriaceous, dark green, purplish beneath, 4 inches long, half an inch wide. Raceme $1\frac{1}{2}$ inch long, lengthening gradually, subterete, with short-ovate bracts. Pedicels $\frac{1}{4}$ inch long. Flowers half an inch long; upper sepal lanceolate-acute, lower ones ovate-triangular, gibbous at base, whitish violet outside, violet within. Petals narrower, lanceolate-acute, violet. Lip white; side-lobes obliquely ovate, incurved; epichil low, indistinct; spur fleshy, ovate, subacute, with a brown bar near the mouth, and numerous white and some brown hairs within. Column stout, white, base brownish; stelidia thick, incurved. Anther semiglobose. Stigma very small, subtriangular.

On trees along the stream at the Ninth Camp. Not common. A very distinct plant in its thick leaves and violet flower. The lip has much the shape of that of *Sarcochilus calceolus*. The roots are very stout and corky.

*227. *THRIXSPERMUM SCORTECHINII*, *Ridl. op. cit.* p. 330. Woods on the Camp stream, Padang. Not common.

Distribution. Malay Peninsula.

228. *PODOCHILUS SCIUROIDES*, *Rehb. fil.* Very common on trees in the woods on the Padang.

Distribution. Malay Peninsula.

229. *PODOCHILUS TENUIS*, *Lindl.* Mossy stones on the Padang woods. Not common. Leaves more spreading than usual. Out of flower.

*230. *ACRIOPSIS JAVANICA*, *Bl.*; *Ridl. op. cit.* p. 330. On trees, rare. Flowers not seen.

231. *HETÆRIA ELEGANS*, *Ridl. op. cit.* p. 330. Woods by the Teku, nearly out of flower. Endemic.

232. *CRYPTOSTYLIS ARACHNITES*, *Bl.* Wet woods by the stream on the Padang and near the Gully.

Distribution. India, Ceylon, Malay Peninsula, and Java.

*233. *HABENARIA ZOSTEROSTYLOIDES*, *Hook. fil.*; *Ridley, op. cit.* p. 330. Very common on the Padang, both in wet woods, where it attains the height of two feet with well-developed leaves on the stem, and in damp open spots on the Padang, where it is reduced to a height of 6 inches, with the stem-leaves reduced to little more than sheaths. It ascends to a height of 7,186 feet. Flowers bright green.

Distribution. Mt. Ophir and Perak hills.

*234. *CYPRIPEDIUM ROBINSONII*, n. sp.

Cypripedium barbatum, *Ridl. op. cit.* p. 330.

Stems frequently stoloniferous. Leaves few, about four, elliptic-oblong, subacute, glabrous, 3 inches long $1\frac{1}{2}$ inch wide, pale green with darker spots and transverse bars. Peduncle erect, over a foot tall, purplish, hairy, half an inch long. Flower solitary. Upper sepal broadly ovate, narrowed at the

base, apex somewhat abruptly acute, base dull purple, above pale green, darker at the edges and the tip, hairy, $1\frac{1}{2}$ inch long, $\frac{3}{4}$ inch wide. Lower pair shorter, ovate, pale green, acute, hairy. Petals 2 inches long, spatulate, broadest towards the tip, which is subacute, half twisted at the base, glabrous; margin dull yellowish green with a longitudinal purple central bar, many round spots. Lip glabrous, purplish, $1\frac{1}{4}$ inch long, $\frac{3}{4}$ inch wide. Anther orbicular, widely emarginate at the tip and retuse behind, yellowish with a green centre. Fruit cylindric, narrowed at each end, 2 inches long.

Common in woods near the streams, growing in deep moss, in shady spots at an altitude of 5,600 feet on the Padang.

Certainly allied to *C. barbatum*, Lindl., but distinct in the smaller abruptly, acuminate upper sepal and petals without hairs on the glandular dots. The leaves are much smaller than in most specimens of *C. barbatum*, Lindl.

APOSTASIACEÆ.

*235. *APOSTASIA NUDA*, Br.; *Ridl. op. cit.* p. 330. Banks of the stream at the Padang Camp.

Distribution. The whole Peninsula.

SCITAMINEÆ.

*236. *HEDYCHium COLLINUM*, *Ridl. op. cit.* p. 331. This beautiful and fragrant plant grows near the Gully and on the stream-banks on the Padang, but is not common. It has only been previously met with on Kedah Peak and is allied to *H. Gomezianum*, Wall.

237. [*ALPINIA PETIOLATA*, *Bak.* Was found near Wray's Camp at 3,300 feet. Occurs also in Perak.

238. *A. MURDOCHII*, *Ridl.* Also grows here. It was found in flower and fruit.]

239. *CAMPTANDRA TAHANENSIS*, n. sp.

Whole plant 5 or 6 inches tall, succulent. Sheaths four or five on the stem, lanceolate, acute, lower ones ribbed when dry. Leaves 2 to 4, ovate-acuminate, caudate, obliquely bright green, 3 to $3\frac{1}{2}$ inches long, $1\frac{1}{4}$ inch wide; petiole 1 inch long. Peduncle $\frac{1}{2}$ to $\frac{3}{4}$ inch long. Bract urn-shaped, top rounded, $\frac{1}{2}$ – $\frac{3}{4}$ inch long, green, containing two flowers. Calyx cylindric, $\frac{1}{2}$ inch long, truncate, slightly dilated upwards, reddish, persistent in fruit. Corolla-tube slender, half an inch long, protruding far from the top of the bract; lobes white, $\frac{3}{4}$ inch long, oblong. Lip large, obovate, with two yellow central semiovate longitudinal keels. Capsule oblong, $\frac{1}{2}$ inch long.

Gunong Tahan, abundant in damp spots by streams, but nearly over in July. Allied to *C. ovalifolia*, *Ridl.*, of Semangkok Pass, but with larger flowers, with longer tube to the corolla, and different lip.

The second flower in the bract opens about the time that the fruit of the first flower is ripe.

240. *CONAMOMUM SERICEUM*, n. sp.

Rhizome large, supported on stilt-roots. Leafy stems 8 feet tall. Leaves oblong-lanceolate, 18 inches long, 7 inches across, narrowed at the base, shortly cuspidate at the apex, glabrous except on the edges of the tip, dark green above, paler beneath; petiole short, grooved; ligule $\frac{1}{4}$ inch long, oblong, truncate, silky. Peduncles stout, 6-7 inches long, covered with 5 large, glabrous, ribbed, truncate sheaths, about 2 inches long. Spike cylindric, stout, 4 inches long, dense-flowered. Rachis hairy; pedicels half an inch long. Bracts urceolar, subulate, with an acuminate cusp, pale, papery, silky, containing 2 flowers on short pedicels, the second enclosed in another and smaller bract. Outer bract 1 inch long. Calyx tubular, thin, papery, prolonged at one side into a cusp, glabrescent, half an inch long. Corolla-tube short, hardly as long as the calyx; lobes elliptic, oblong, white, shorter than the stamen, obtuse. Lip 3-lobed, ovate; lobes not deeply cut and subequal in length, yellow, darker on the mid-lobe, base and side-lobes spotted with pink. Anther oblong, crest 3-lobed, central lobe oblong, truncate or rounded, side-lobes oblong, truncate or curved, slightly acuminate, white tinted and spotted with pink. Fruit not ripe, elliptic, ribbed when dry, glabrous.

Gunong Tahan, in damp woods in the Gully and in the woods bordering the streams in the Padang. Common.

This species is allied to *C. citrinum*, Ridl., of the Taiping Hills, and Bujong Malacca, differing in the papery, cuspidate, pubescent bracts, the form of the lip (which is much more distinctly lobed), silky ligule, etc.

*241. *GEOSTACHYS ELEGANS*, Ridl. *op. cit.* p. 331. Common in the drier part of the woods on the upper slopes above the streams. Also collected by Robinson. In many plants the leaves are of a brilliant purple beneath, very attractive. The corolla is yellow, the lip darker in colour, and there is a pair of short linear crimson staminodes at the base. There are two flowers in each bract, which I find also in some, at least, of the type-form from Mt. Ophir.

The only other locality for this plant at present known is Mt. Ophir.

AMARYLLIDÆ.

242. *CURCULIGO LATIFOLIA*, Dryand.; *ancea*, p. 59. Narrowed-leaved form. Wet woods of the Teku, 4,600 feet elevation.

Distribution. Burmah, Andamans, whole Peninsula, and Malay islands; common, but seldom at any great altitude.

BURMANNIACEÆ.

*243. *BURMANNIA LONGIFOLIA*, Becc.; Ridl. *op. cit.* p. 331; *ancea*, p. 59. Abundant in damp shady spots all over the Padang, and along the ridges from about 4,000 feet upwards. The flowers are white with blue corolla and calyx-lobes.

Distribution. From Borneo (Sarawak) all over the Malay Peninsula at an altitude of 3,000 to 6,000 feet. Absent from Mt. Ophir.

*244. BURMANNIA DISTICHA, L.; *Ridl. op. cit.* p. 331. Common all over the Padang, except in very dry spots. Flowers light blue.

Distributed over the mountains of Australia, China, Sumatra, Ceylon, and Kasiya; in the Malay Peninsula only seen from Mt. Ophir and Kedah Peak.

I have in vain sought for any insect visiting this plant and *B. cælestis*, Don. The petals and sepals in *B. disticha* remain connivent the whole day, but are most widely separated about midday, leaving only a narrow opening for an insect to pollinate it.

245. [BURMANNIA TUBEROSA, Becc. Occurs at Kuala Teku in muddy spots on the banks of the Teku River. It is scattered all over the Peninsula in the low country.]

LILIACEÆ.

246. PROTOLIRION PARADOXUM, *Ridl. & Groom, antea*, p. 59. Common in wet woods on the Padang to 6,000 feet elevation. As usual associated with *Dacrydium*.

Distribution. All high hills in the Peninsula where these conifers grow.

247. DIANELLA PARVIFLORA, n. sp.

Habit of *D. ensifolia*, Red. Stems one or two, about 6 inches long, covered with distichous leaves from the base and flattened slightly. Leaves linear-acuminate, coriaceous, usually revolute at the margins when dry, armed with short thorns on the midrib and the margins for the whole length, 12 to 18 inches long, $\frac{1}{2}$ inch wide. Panicle terminal, elongate, lax, 14 inches long, with a single, lanceolate, acute sheath halfway up; branches few and short, about half an inch long. Bracts lanceolate-acuminate, a quarter of an inch long. Flowers 4 or 5 together a quarter of an inch across. Sepals ovate-obtuse. Petals longer, elliptic-obtuse, all blue in the centre, fading off to dirty white at the edge, spreading, not reflexed. Stamens shorter than the petals; filaments short, white, abruptly dilated above into a yellow swelling. Anther brown, dehiscing at the apex only. Ovary shining green. Style cylindric, white. Berry deep blue.

This species is distinct from *D. ensifolia*, Red., the common lowland species, in its smaller flowers, shorter and differently shaped stamens, ovate sepals, and longer petals. When dried, it might easily be mistaken for *D. ensifolia*. This plant is recorded from Mt. Kinabalu at 7,000 to 8,000 feet altitude by Dr. Stapf in the 'Flora of Mt. Kinabalu.' It is improbable that this lowland and sea-shore plant should occur at such an altitude. May the Kinabalu plant not be *D. parviflora*, Ridl.?

248. RHUACOPHILA JAVANICA, *Bl. Enum.* i. 14; *antea*, p. 59.

Stems usually numerous, 6 to 8 feet tall, strongly flattened. Leaves rather flaccid, glaucous, subcoriaceous, linear, acuminate, unarmed, midrib very inconspicuous, disappearing

altogether towards the tip, 12 inches long, 5 inches wide, or in younger plants smaller. Panicle terminal, 3 to 6 inches long, sessile (*i.e.*, there is no bare peduncle as in the other species); branches numerous, 3 inches or less, with lax secondary branches, elongating in fruit to half an inch long. Bracts at base of primary branches leaf-like, lanceolate, broad. Bracteoles small, lanceolate or ovate-lanceolate, papery. Flowers white, on short pedicels, a quarter of an inch long. Sepals oblong-obtuse, tip rounded, 3-nerved. Petals nearly as long but wider, 5-nerved. Stamens shorter; filaments linear, rather thick, flat, half as long as the elongate linear obtuse anther; base of anther shortly bifid, yellow. Ovary small, ovoid. Style cylindric, fairly stout, as long as the petals. Stigma small, capitate. Berry oblong, half an inch long when dry. Seeds 4 in each cell, ellipsoid, slightly flattened towards the base, $\frac{1}{16}$ inch long, black, shining.

On rocks in the Teku River and its affluents, occasionally on banks, altitude 5,600 to 6,000 feet.

I have also fruiting specimens from Mohammed Aniff, of the Penang Gardens, from Gunong Kerbau at 7,000 feet altitude. Of flowers I have only seen one spray, and those not opened. They differ from those of *Dianella* in the linear filaments not swollen at the top and the elongate anthers. The fruit, too, with its more numerous and small ellipsoid polished seed is quite unlike that of *Dianella*. From *Stypandra* it mainly differs in its glabrous stamens and its baccate fruit. The perianth dries over the fruit and is not twisted.

This distinct plant was referred to the genus *Dianella* by Kunth under the name of *D. javanica*, and to *D. ensifolia*, Red. by Baker. It occurs also in Java and Borneo; on Gunong Kerbau, Perak, 4,500—5,000 feet and on Koh Pennan off the coast of Bandon, Siamese Malaya.

249. SMILAX PEGUANA, DC.

Unarmed; stem smooth, brown, wiry, $\frac{1}{8}$ inch across. Scales at the base of the branches oblong, truncate, or lanceolate. Leaves coriaceous, ovate with rounded base, occasionally cuneate-acuminate or, more rarely, lanceolate, occasionally narrow-oblong, 3 inches long by 2 inches wide or less, above bright green (olivaceous when dry), beneath white, drying glaucous; nerves 5, conspicuous on both surfaces, reticulations conspicuous; petiole half an inch long, with a pair of short tendrils. Peduncles axillary, a quarter of an inch long in flower, bearing an umbel of 5 or 6 flowers on pedicels as long. Sepals rather coriaceous, ovate obtuse. Petals much smaller, lanceolate, obtuse, narrow. Stamens shorter, on very short filaments. Anthers broadly elliptic. In fruit peduncles elongated, 1 inch long; pedicels $\frac{1}{2}$ inch long. Berry (nearly ripe) globose, green, $\frac{1}{2}$ inch through.

Common in the woods in the Padang, but out of flower at the time of our visit. I have not seen this before from the Malay Peninsula, but have exactly the same plant from Matang collected by Hullett and from Mt. Serapi collected by Haviland,

both localities in Sarawak. The leaves are very variable in shape, the fully developed ones being ovate. I refer this plant, very variable as it is in leaf, to *S. peguana* of Burmah, as described in the 'Flora of British India.'

250. *SMILAX LÆVIS*, Wall. Woods on the Padang, in fruit only. It occurs on all our higher mountains from 2,500 to 5,000 feet and also in China.

XYRIDEÆ.

*251. *XYRIS GRANDIS*, Ridl. *op. cit.* p. 332. This remarkable plant occurs very abundantly in damp spots by streams from Wray's Camp to the Padang, 3,300 to nearly 6,000 feet elevation. It grows in shady woods, the flowers are small in proportion to the size of the plant, dark yellow, the base of the corolla is tubular. Stamens, 3 fertile and 3 sterile. It is pollinated partly at least by the *Bombus*. Endemic.

*252. *XYRIS RIDLEYI*, Rendle; Ridl. *op. cit.* p. 332. Extremely abundant all over the Padang in slightly damp spots. A most attractive little plant with its bright yellow flowers. It varies much in size, and in damp sunny spots attains a height of over a foot with bright red stems. It also occurs on Kedah Peak in grassy spots.

TRIURIDEÆ.

253. *SCIAPHILA AFFINIS*, Becc. *antea*, p. 59. From Wray's Camp to the stream on the Padang.

Distribution. Whole Peninsula and Borneo.

254. [*SCIAPHILA ASTERIAS*, n. sp.

Stems slender, 10–11 inches tall. Leaves lanceolate-acuminate, $\frac{7}{16}$ inch long, not sheathing. Raceme lax; flowers distant, white. Bracts $\frac{3}{4}$ the length of the pedicel, which is $\frac{1}{8}$ inch long. Perianth $\frac{1}{2}$ inch across; lobes nearly equal, linear, subulate, very narrow from a broader lanceolate base. Stamens in the male flower 3, orbicular or oblong, sessile, closely approximate, glabrous. Female perianth shorter; carpels numerous, oblong, clavate, papillose, whole head $\frac{1}{16}$ inch across.

Wray's Camp at 3,300 feet.

Allied to *S. major*, Becc., but the perianth-lobes are much longer and narrower.

255. *SCIAPHILA MAJOR*, Becc. Wray's Camp at 3,600 feet.

Distribution. The Malay Peninsula and Borneo.]

PALMÆ.

256. *PINANGA BREWSTERIANA*, n. sp.

A tufted or solitary stemmed palm with the stems attaining a height of about 6 feet and a diameter of about half an inch, reddish brown. Leaves usually simple, occasionally lobed; sheaths 7 or 8 inches long, scurfy, dark brown; petiole 6 to 12 inches long, stout, brown, scurfy; blade obcuneate, narrowed to the base, apex deeply bilobed (more rarely with a pair of

lobes at the lower part); terminal lobes with 9 or 10 acute teeth about an inch long and half an inch wide at the base; whole blade about 2 feet long and 8 inches across in the widest part; terminal lobes 6 inches long; nerves and midrib very prominent on both surfaces, above dark green, beneath glaucescent. Spathes boat-shaped, about 6 inches long. Spadix 2-3 branched; peduncle 3 inches long; branches 4 inches wide, densely covered with reddish wool. Flowers spirally arranged, remote. Male flower $\frac{1}{2}$ inch long; petals triangular, acuminate. Female $\frac{1}{2}$ inch long, subglobose. Sepals orbicular, striate, glabrous. Fruit (not quite ripe) olive-shaped, half an inch long. Seed nearly as long, base blunt, ribbed externally. Albumen ruminant, with rather large intrusions running nearly to the centre.

This palm is the only one, except two *Calamæ*, occurring on the Padang. It is abundant in all the wet woods from below the Gully to nearly 6,000 feet elevation. It constantly emits lateral buds from the stems. I had a great difficulty in finding any male flowers, till by cutting into a leaf-sheath that appeared to be swollen I found a much decomposed spathe with some rotten flowers on the spadix, and the female flowers, though not yet free from the leaf-sheath, were fairly developed. I suspect that this palm is usually self-fertilized before the spathe opens. Spadices with female flowers and young fruit were abundant. The rachis of the spadix is red and the fruits apparently black when ripe.

* 257. [*LIVISTONA TAHANENSIS*, Becc. Abundant by Wray's Camp up to about 4,000 feet, when it disappears. Endemic.]

258. *CALAMUS ELEGANS*, Ridl. Abundant from round Wray's Camp to about 7,000 feet on Gunong Tahan. A slender rattan of no great length, probably the highest-growing palm in the Malay Peninsula.

Distribution. Bujong Malacca, in Perak.

259. [*EUGEISSONA BRACHYSTACHYS*, n. sp.]

A bush-palm smaller than *E. tristis*. Leaves erect, 14 to 20 feet long, the petiole terete, 12 feet long, an inch through, glaucous green finely speckled with dull red, with two rows of short spines, one on the back and one on the front; spines black, half an inch or less long, in pairs, one pointing upwards, the other downwards; leaflets deep green, alternate, lanceolate, caudate, broad, base shortly narrowed, 2 feet long, 3 inches wide; tail 4 inches long, midrib raised, nerves 14; rachis, back rounded, upper surface flat. Flower-spike about 3 feet tall; peduncle short, stout. Spathes broad, lanceolate, cuspidate, clasping the stem, base green above, red, scurfy, with short erect black spines increasing in length towards the apex; cusp acuminate, 6 inches long; upper sheaths shorter, about 15 in number. Lower flowers paniced, upper branches racemose, on peduncles of dark brown ovate bracts; peduncles $1\frac{1}{2}$ inch long. Calyx cylindric, irregularly lobed, green. Petals narrow,

linear, acuminate, 2 inches long, green. Fruit ovoid, shortly broadly stipitate at base; apex abruptly beaked; beak half an inch long, obscurely trigonous; scales ovate, triangular, obtuse, margins paler, thin, shortly fimbriate.

On the drier part of the hill at Kuala Teku.

A very distinct plant from the only other Peninsular species, *E. tristis*, Griff., in its smaller clumps, broad leaflets, and short inflorescence. It only occurs on the drier parts of the hills and woods at Kwala Teku.]

ARACEÆ.

260. *HOMALOMENA ANGUSTIFOLIA*, Hook. fil. Abundant in cracks in the rocks of the Teku River to a height of about 5,000 feet. There are two forms, the ordinary long-leaved form with leaves 5 inches long on a four-inch petiole, and a dwarf form forming dense mats 2 to 3 inches high. This form has spathes as big as those of the taller plant, and both have cusps rather longer than usual.

It occurs in mountain-streams all over the Peninsula, varying in form according to the rapidity of the stream at its place of growth.

261. *HOMALOMENA PUMILA*, Hook. fil. *antea*, p. 60. Wet woods on the first stream on the Padang; local.

Common in the Malay Peninsula from sea-level to about 4,000 or 5,000 feet elevation; also Borneo.

*262. *SCINDAPSUS SCORTECHINII*, Hook. fil.; Ridl. *op. cit.* p. 332. Woods on the Teku, where it joins the stream from the Camp, and a short way up that stream. Collected here also by Robinson. Out of flower in July.

Usually common on rocks and trees at 3,000 to 4,000 feet in Selangor, Perak, and Kedah, but not common on Gunong Tahan. It does not seem to go over 5,000 feet elevation.

PANDANACEÆ.

263. *PANDANUS KLOSSII*, n. sp.

Stems usually solitary, 8 to 20 feet tall, 3 inches through, rounded, grey and bare, leafy at the top only. Leaves linear, somewhat abruptly cuspidate, over 5 feet long, 3 inches wide, hard and coriaceous, with strong black-hooked or ascending thorns $\frac{1}{4}$ inch long along the edge and keel to the lower part, smaller and closer-set on the edges upwards, very small and close on the cusp. Cusp slender, stiff, 1 inch long. Capitulum globose or oblong, as big as the head, on a short stout peduncle 6 inches long, breaking up into syncarps of 6 or 7 fruits, $2\frac{1}{2}$ inches long, above bluntly angled; apex of fruit shortly free, truncate, obscurely angled, and cone-shaped. Style $\frac{1}{8}$ inch long, slightly bent, acute, dark brown, simple or branched, broad with two spreading points. Stigma linear for the whole length.

Common all over the Padang. In the more open exposed spots the stem is short and erect, about 6 to 8 feet tall; in the woods the stems are long and weaker, often falling about at

all angles, 20 feet or more long. The capitulum is large and showed signs of turning red or orange; the drupes are separate till the fruit is nearly ripe, when from 6 to 7 become adnate and remain so as the whole fruit breaks up.

I do not know any pandan like this in the Peninsula. The fruit when ripe has the appearance of that of *P. fascicularis*, but it has thorn-like stigmas belonging to a different section. The stigmas are often simple, acute, thorn-like processes, but frequently also on the same head are broad, flat, and bifurcate at the lip, with recurved points like those of *P. bicornis*, Ridl.

No trace of male flowers could be seen anywhere. The plant is very abundant, almost filling up the woods in some places.

264. *FREYCINETIA* sp. A large and stout species of *Freycinetia* is abundant in the Teku woods. No signs of inflorescence were seen, but it resembled *F. valida*, Ridl.

ERIOCAULACEÆ.

*265. *ERIOCAULON HOOKERIANUM*, Stapf.

Eriocaulon macrophyllum, Ridl. op. cit. p. 332.

Dry spots on Gunong Riam, 6,000 feet altitude, and on summit of Gunong Tahan, 7,100 feet. This exactly resembles the type-plants of Kinabalu collected by Haviland. I find the petals of the male flower very unequal, one being considerably longer than the other.

In the lower-lying and damper parts of the Padang there is another plant which differs from this species in having a less distinct stem and thin long flaccid leaves, but of which the flowers bear a very close resemblance to those of *E. Hookerianum*, and it is possible that it is a lowland form of that species. In the previous paper I named this *E. macrophyllum*, Ruhl., only known from a Javan specimen collected by Warburg, but closely resembling a Javanese plant collected by Horsfield and now in the British Museum. (It is always regrettable that so many authors of the 'Pflanzenreich' volumes appear to have omitted to inspect the largest and most important herbaria of Kew and the British Museum.)

I think, however, this plant is probably not the plant intended by Ruhl. for his *macrophyllum*, and I cannot find any description to exactly suit this lowland species. I will describe it herewith, and give it a name:—

266. *ERIOCAULON SILICICOLUM*, n. sp.

Stem very short, herbaceous, covered by the bases of the leaves. Leaves linear, flaccid, herbaceous, acute, 5 to 8 inches long, $\frac{1}{8}$ to $\frac{1}{4}$ inch wide, with a few sparse hairs soon disappearing. Scapes 1 to 3 in a tuft, slender, erect, 12–18 inches tall, glabrous, ribbed. Spathe at base tubular, 4 inches long, with lanceolate elongate limb. Capitulum $\frac{1}{4}$ to nearly $\frac{1}{2}$ inch across. Involucral bracts oblong, rounded at the tip, pubescent. Male flowers: bracts cuneate, apex rounded, pale translucent, apex thickly covered with white hairs. Perianth stalked. Sepals oblong, cuneate, tipped with white hairs and black-dotted,

connate for most of their length. Corolla hardly longer; lobes 3, very unequal, one twice as long as the other two, all crested with white hairs. Stamens with pale whitish filaments; anthers rather large, black, little longer than the shorter perianth-lobes. Female flower: sepals as in the male. Petals free to base, linear, with long white hairs all over. Capsule trilobed, globose. Seed oblong, obtuse at both ends. Style elongate, slender.

In damp spots on the Padang.

Certainly near *E. macrophyllum*, Ruhl., from description, but the unequal male petals are those of *E. Hookerianum*, and the leaves are always shorter than the culm.

CYPERACEÆ.

267. *SCIRPUS CLARKEI*, Stapf. Abundant in cracks of rocks in the streams on the Padang. This slender sedge forms good-sized tufts in the rapid torrents, the culms being often pendent in the water. I find the nut distinctly trigonous and narrowed at the base, dilated upwards, where it ends abruptly in a short beak, the style base. Stapf describes it as "obovato oblongodorso convexo leviter carinata, facie subplana."

It was first obtained in Kinabalu by Haviland, and has not been found elsewhere.

268. *ACTINOSCHÆNUS FILIFORMIS*, Benth var. *RUPESTRIS*. A dwarf tufted form, 6 inches tall, with very slender erect stems and capitula hardly an inch across.

Common on one or two of the rocky slopes between the Camp stream and the top of Gunong Tahan. I have the same form from Gunong Dai in Lingga, collected by Mr. Hullett, and from the top of Ben Karum in Sarawak by C. J. Brooks.

The usual form of the species has long pendent or weak stems often twice as thick as in this and has larger capitula. This form occurs in Hongkong, Ceylon, and the Karimon and St. Barbe Islands, the waterfall, Taiping, Mt. Ophir, Penang Hill, and Kedah Peak.

269. *CLADIUM PULCHRUM*, n. sp.

Rhizome short, woody; base of stem swollen, covered with broad red-brown sheaths. Leaves coriaceous, linear, obtuse, narrowed upwards, base dilated, margins denticulate, scabrid or smooth, 6 to 9 inches long, $\frac{1}{2}$ inch broad, dilated, base $\frac{1}{2}$ inch wide. Inflorescence 10 to 14 inches tall; peduncle glaucous, terete. Panicle bracts at the base 1 inch long, narrowly linear, base dilated, sheathing, deep red. Rachis flexuous. Branches few, 6 or 7, about half an inch long, crowded spikelets on short angled peduncles. Lower glumes empty, 3, two basal, broadly lanceolate, cuspidate, strongly-nerved, red; upper much longer, more narrowly lanceolate, acute, dark red, fertile; glume lanceolate, as long as the previous one. Stamens 3; filaments linear; anthers narrow, linear, yellow. Style long. Stigmas 3. Bristles 3, narrowed upwards, pubescent, half as long as the nut. Nut (not ripe) narrowed into the style.

Abundant on the Padang in slightly damp spots. In more shady spots the bracts are more green, and there is a slight tendency to lengthening of the panicle. This species is undoubtedly near to *Cl. undulatum*, Thw. (*Tricostularia fimbriatylloides*, Benth.), but that is a much more elongate tall plant forming great tussocks of long leaves in sandy spots at Pekan, Setul, etc., and occurring in Ceylon. This plant is short, dense and reduced, and has the habit of a rush, and there are also distinct differences in the form of the glumes.

270. *CLADIUM MAINGAYI*, Clarke. Very common on the Padang. Occurs also on Mt. Ophir and on Gunong Bubu in Perak, otherwise only known from Celebes.

271. *LEPIDOSPERMA CHINENSE*, Nees. Common all over the Padang up to the summit of Gunong Tahan. Also occurs in Mt. Ophir and Gunong Kerbau, collected by Mohammed Aniff at 7,000 feet elevation.

Distribution. South China.

The typical form with fairly stout glaucous stems, attaining a height of six feet, grows among *Gleichenia* and other fairly tall plants in damp thickets as high as 7,186 feet altitude. On the open bare Padang in cracks in rocks and among the quartz-fragments grows another form extremely abundant, much reduced, and dwarfed, for which I propose the varietal name of var. *alpina*. Dwarf tufted plant, 6 to 8 inches tall; stems rigid, obscurely angled, as are the leaves. Leaves acute, almost pungent, nearly as long as the flowering stems. Panicle an inch long, denser, with very short branches much reduced. Hypogynous bristles ovate-acuminate, broader than in the type.

Very different in appearance and habit from the tall rush-like type, with its terete, rather pithy stems, and elongate slender panicle, 3 inches long, with branches of several spikelets, but it seems only a dwarfed, stiffer, and reduced alpine form.

272. *RHYNCHOSPORA GLAUCA*, Vahl. On slightly damp spots on the Padang. A very slender form.

Distribution. All the Tropics, except India.

273. *GAHNIA JAVANICA*, Mor. *antea*, p. 60. Common on the Padang. In open rocky spots it develops a stout ropelike prostrate stem about 3 feet long covered with leaf-bases and roots. This usually lies in a curve on the ground. The inflorescence of this Padang form is thin and poor compared to the robust panicles of the plants grown in better soil.

Distribution. From Fiji and New Caledonia, through the Malay Archipelago and Peninsula, to Kedah Peak, from 1,500 to 7,000 feet. And on Gunong Kerbau, Perak, 5,500-6,600 feet.

274. *GAHNIA TRISTIS*, Nees. Not common here. It occurs also on the ridges by Wray's Camp. This plant is common near the sea-coast in Singapore, Johore, etc., and also on the mountains of Ophir and Kedah Peak.

275. *SCHÆNUS DISTICHUS*, n. sp.

A small tufted plant, forming small clumps; the stem erect, from less than an inch to 6 inches or more long, branched, and terminating in flattened branches with distichous close-set leaves. Leaf-bases coppery, above bright green, linear, triquetrous, scabrid, stiff, 1 to 6 inches long and $\frac{1}{2}$ inch or less thick. Inflorescence shorter than the leaves, from one of the upper axils. Culm slender, strongly curved, bearing 2 or 3 sheathing leaves. Sheaths with a broad scarious margin; back green, grooved; from the sheath rise one or two branches half an inch long, angled, scabrid, bearing one fusiform spikelet $\frac{1}{2}$ inch long. Glumes 4, imbricate, lanceolate, maculate, deep violet-purple, keeled; lower ones empty, terminal one only fertile. Style trifid, slender, purple. Nut pale pyriform, covered with the pericarp, obscurely 3-angled and beaked; hypogynous bristles none.

Padang, abundant, but seldom in flower; Perak, Gunong Kerbau, 7,000 feet altitude (*Aniff*, May 1910).

This remarkable little sedge, with its leaves forming small fans, was very abundant on the Padang in dry or slightly damp spots. It forms clumps a few inches across, and in most places was only an inch or two high. I found it larger in damper shadier spots under bushes on the summit of Gunong Tahan, and the specimens sent from Gunong Kerbau by Mohammed Aniff were very much larger, having a stout stem six inches long and leaves of equal length.

The flowers were difficult to find, and it does not seem to be at all floriferous. It only bears a few spikelets on its very short culm. The spikelets resemble those of other species of the genus, but there are no visible hypogynous bristles. I do not know any plant resembling it.

276. *SCLERIA CARPHIFORMIS*, n. sp.

Stems 2 to 3 together in a tuft, thick at base, covered with hairy red sheaths about one inch or less long, lower sheaths split on one side with a lanceolate point on the other. Leaves 3 or 4, linear, obtuse, 6 inches long, $\frac{1}{2}$ inch wide, glaucous green with long white hairs on the edges and keel. Panicle shorter, 2 inches long, with two or three distant fascicles of spikelets, subsessile, or the lower one shortly pedicelled. Bracts leafy, the upper-most one elongate, $1\frac{1}{2}$ inch long, resembling an ordinary leaf. Spikelets 2 or 5 together, 2 to 3 males to one female. Male spikelet $\frac{1}{2}$ inch long, subterete; glumes dark red with white hairs. Four lower glumes narrowly lanceolate-cuspidate, empty; four terminal ones similar, but each containing 3 stamens. Filaments bright red, longer than the glumes. Anthers very narrow, linear, long, minutely cuspidate. Female spikelet shorter and thicker, with 4 bracts, the lowest ovate, lanceolate, but the others lanceolate, reddish, all with white hairs. Flower solitary. Style slender, trifid. Nut hemispheric with a broad base, $\frac{1}{10}$ inch long, white, thickly sprinkled over with pustules bearing brownish hairs stellately arranged. Disc large, flat, orbicular.

In slightly damp spots on the Padang beyond the 8th Camp, local, but abundant. It also grows on Kedah Peak. This was named by me *Scl. Neesii* in the "Materials." Mr. Clarke, to whom I had referred it, states that it appeared to be a variety of that Ceylon species, but might be made a new species. I obtained a better set of this curious plant on Gunong Tahan, and find it differs markedly from the Ceylon species, not only in habit, smaller panicle, and other such points, but in the fruit, which in the Ceylon plant is described as "very small, $\frac{1}{20}$ to $\frac{1}{15}$ inch, globose, echinate, disc obscure." In our plant the nut is twice as large, pustular, with brown hairs on the pustules, and seated on a large conspicuous disc. The Kedah Peak plant is much less hairy than that from Gunong Tahan, and more weak—probably these differences are due to the surroundings. The Kedah Peak one was growing in a grassy spot surrounded by forest, that of Tahan on slightly damp exposed rocks and screes.

277. *SCLERIA RADULA*, Hance; *antea*, p. 60. A tall plant, often over 6 feet high; stem with a distinct but low wing, stout, over $\frac{1}{4}$ inch through. Leaf sheath-mouth with a hemispheric rounded lobe opposite the leaf-blade; blade linear-acuminate, 18 inches long, half an inch wide, margins and midrib scabrid. Panicles spreading, two inches long and as wide, lax, on peduncles two inches long; slender terminal panicle larger and more lax. Bracts elongate, almost setaceous from a broader hairy base, about $\frac{1}{4}$ inch long. Spikelets deep purple, one female at the base of the branch and 2 or 3 males above, rather distant. Rachis triangular. Female spikelet with ovate-acute glumes, $\frac{1}{4}$ inch long. Males cylindric, terete, $\frac{1}{8}$ inch long. Glumes lanceolate, all deep red. Nut globosely ovoid, white, quite smooth, $\frac{1}{8}$ inch long, base broad. Disc conspicuous, white, three-lobed; lobes subacute, margins between decurved.

Wooded stream-banks on the Padang.

Near and much resembling *S. elata*, Nees, in habit, but the nut is quite smooth and the disc large. The whole plant has the purple colouring that all this set of mountain-form *Sclerias* possess.

Distribution. Hongkong and Perak (Gunong Kerbau, 4,200 feet.)

278. *CAREX RIVULORUM*, n. sp.

A tufted plant, emitting stolons. Leaves linear-acuminate, 2 feet long, $\frac{1}{4}$ inch wide; base purplish brown, minutely scabrid on the back; midrib prominent. Culm 3 feet long, very slender, weak, terete. Foliaceous bracts sheathing, very narrow, longer than the lower spikes. Spikes 6, pedunculate, very slender, cylindric, an inch long, $\frac{1}{16}$ inch through, lower ones all female, or with male flowers at the tip; upper one male only. Glumes ovate, lanceolate, keeled, with a long mucro, as long as the utricle, pale brown, minutely pubescent, edges and mucro scabrid. Utricle $\frac{1}{4}$ inch long, fusiform,

narrowed and stipitate at the base, prolonged above into a long beak, triquetrous, ribbed, and densely hairy with appressed hairs; mouth bifid. Style long, projecting far beyond the beak, hairy. Stigmas 3, long. Nut shorter, fusiform, triquetrous, narrowed at both ends, base of style not thickened, dark brown.

Mossy wooded stream-banks on the Padang. Nearly out of flower. Altitude 5,600 feet.

Allied to *C. fusiformis*, Nees, but with hairy utricles; possibly only a variety of that species.

279. *CAREX LIGATA*, Booth. In damp woods along the stream from Gunong Riang and Gunong Tahan in shady spots, local but abundant.

Distribution. From Formosa to China. Not previously recorded from the Malayan region.

280. *CAREX LINDLEYANA*, Nees, var. A tall sedge forming large tufts by the banks of the same stream as the last, but in more open spots, less hairy than the typical plant, which occurs in Southern India and Ceylon. New to the Peninsula.

GRAMINEÆ.

281. *ISACHNE ALBENS*, Trin. In woods by a stream, Gunong Tahan, local. Occurs in the Larut Hills, Gunong Semangkok, and Telom, from 3,000 feet altitude upwards.

Distribution. India, China, and Malay Islands, and in the Malay Peninsula on the top of the Larut Hills.

282. *ISACHNE JAVANA*, Nees; *antea*, p. 61. Abundant in the Padang, but scattered, also seen on a ridge near Wray's Camp. The leaves are very strict and erect, white beneath. Altitude 3,400 to 7,000 feet.

Var. *SAXICOLA*. A densely tufted plant with numerous short stems 3 inches high; leaves half an inch long and more flaccid; panicles short and simple. Glumes I and II narrower and acuter than in type, often purplish.

This grows in the cracks of the stones in the streams, and, though very different in appearance from the type-form, I find connecting forms and conclude it is merely a form modified by its habitat.

Isachne javana occurs in Burmah, Java, and Borneo, and in the Malay Peninsula on Mt. Ophir, Gunong Bubu, Gunong Kerbau, 6,600 feet, Gunong Batu Puteh, and in Penang.

GYMNOSPERMÆ.

CONIFERÆ.

*283. *AGATHIS FLAVESCENS*, Ridl.

A tree about 40 feet or less on the open woods of the Padang, with a diameter of a foot or less at the base of the trunk; branches spreading, few, yellow. In the lower woods of the Teku of much larger size, trunks occasionally as much as two feet through and a large coma of deep green leaves. Leaves elliptic, narrowed at the base, apex rounded, blunt, very

coriaceous, shining yellow above, paler and not shining beneath (green in shady woods), 2 to $2\frac{1}{4}$ inches long, $\frac{1}{2}$ to 1 inch wide. Male spikes $1\frac{1}{2}$ inch long, $\frac{1}{4}$ inch in diameter, cylindric, obtuse; antheriferous scales $\frac{1}{8}$ inch across the top, $\frac{1}{8}$ inch long; limb nearly orbicular, edges rough. Pollen-sacs few. Cone globose, apex rounded, $2\frac{1}{4}$ inches long, 2 inches through. Scales $1\frac{1}{4}$ inch long, 1 inch wide, broadly obovate; the base trilobed; the two side-lobes acute, incurved; the central lobe oblong; limb narrow, hardly $\frac{1}{4}$ inch wide, elevated in the centre slightly. Seed elliptic, rounded at both ends, flattened, $\frac{1}{2}$ inch long, $\frac{1}{4}$ inch wide; wing large, broad, and rounded at the tip, half an inch or more long.

On the Padang and in the woods near the Teku, and along the ridge towards Skeat's Camp.

The biggest tree on the Padang, though barely 40 feet tall, attaining a larger size in the damper woods, but not as tall as the species on the Penang and Perak Hills. Where exposed the branches and leaves are of a curious yellow colour and very coriaceous, glaucous beneath, the edges reflexed.

It is most closely allied to *A. regia*, Warburg, of Batchian, but the leaves are not lanceolate and acute as in that species. The male cone and the antheriferous scales closely resemble the cone of that species, but the scales of the female cone have a much narrower limb and the base is usually distinctly trilobed, the side-lobes being acute and curved in. The wing of the seed is usually large and broad.

In previous papers I referred this species collected, first by Robinson, to *A. loranthifolia* (*rhomboidalis*, Warburg) of Penang Hill, but, on seeing the plant alive and procuring a nearly ripe cone and male spikes, I find it cannot be classed with that one. The male spikes are smaller than in any other species known to me except *A. regia*, Warb.

*284. *DACRYDIUM ELATUM*, Br.; *Ridl. op. cit.* p. 333. On the Padang in small woods. The trees are of no great size, and it is less common than the next species.

285. *DACRYDIUM BECCARII*, Parl. A shrub or bush, hardly a tree, very common on the Padang, and flowering and fruiting when only 5 feet tall. In this plant the leaves on the flowering shoots are shorter and thicker than those of the barren stems, but not reduced to scales like those of *D. elatum*. The male spikes were either dried or just commencing growth at the time of our visit. They were $\frac{1}{4}$ inch long and rather stout. The antheriferous scales, elongate, lanceolate, $\frac{1}{8}$ inch long. The fruit in the female trees in borne on the ends of the branches, single or 2 or 3 together, and hardly longer than the shortened leaves which surround them. The ovules are inch long, obovoid, shortly acute at the tip, deep black-purple, shining at the tip.

Distribution. Borneo, Mt. Ophir.

286. *DACRYDIUM FALCIFORME*, Pilg. Common in the woods of the Padang, but the trees quite small. I saw none

nearly as large as those of Gunong Semangkok. The male spikes were dried up and young ones just commencing growth. The dried adults $1\frac{1}{2}$ inch long, $\frac{1}{4}$ inch thick, cylindric; the antheriferous scales triangular, rather long acuminate.

Distribution. Borneo and Selangor Hills.

287. *PODOCARPUS NERIIFOLIUS*, Don (*P. bracteatus*, Bl., *Ridl. op. cit.* p. 333). A tree about 20 feet tall with few branches. The peculiarity of this form is that all over the Padang, where it is common, the leaves, which are rather longer and thicker than in most forms, are deflexed, so that at first the tree appears to be dead. In the denser woods the leaves were more normal.

Distribution. Nepal, Malay Peninsula and islands to New Guinea, China, and Yunnan.

*288. *PODOCARPUS CUPRESSINUS*, Br.; *Ridl. op. cit.* p. 333. I only found this in the thick woods by the Teku at about 4,600 feet elevation. Common on all our hills.

Distribution. Malay Islands from Celebes west to North Burmah, Hainan.

GNETACEÆ.

289. *GNETUM MICROCARPUM*, Bl., var. This occurs in the woods by the Camp and on the Teku. It resembles the var. *sylvestris* of the low country, but the leaves are rather narrower and pointed. I have almost the same form from Mt. Ophir and the top of Penang Hill, and it seems to be a mountain-form. The species is common over the whole Peninsula.

FERNS.

*290. *GLEICHENIA DICARPA*, var. *ALPINA*. Common on Gunong Tahan up to 7,000 feet.

291. *GLEICHENIA NORRISII*, Mett.; *Ridl. op. cit.* p. 333. Woods by the Teku River, Gunong Tahan, 4,600 feet altitude. This occurs also in the hills of Perak and Penang.

292. *GLEICHENIA FLAGELLARIS*, Spr. Upper part of the Teku stream, base of Gunong Tahan.

Distribution. Polynesia, Malay Islands and Mascarene Isles. Most of the higher mountains of the Peninsula.

*293. *ALSOPHILA KINGII*, Bedd.; *Ridl. op. cit.* p. 333. Teku woods and along the Camp stream. Not rare in the woods by the streams.

Distribution. Johore and Perak Mountains.

294. *ALSOPHILA DUBIA*, Bedd. Woods of the Teku River at 4,600 feet.

Distribution. Taiping hills.

*295. *MATONIA PECTINATA*, Br.; *Ridl. op. cit.* p. 333. Common all over this district from the ridges above Wray's Camp to the Padang streams.

*296. *LECANOPTERIS CARNOSA*, Bl.; *Ridl. op. cit.* p. 333. Common on trees on the Padang and ridges from 3,300 to 6,000 feet.

Distribution. Malay Peninsula from Singapore to Perak and islands.

*297. *HYMENOPHYLLUM POLYANTHUM*, Sw., var. *BLUMEANUM*, Ridl. *op. cit.* p. 333. Trees in woods, Padang.

298. *HYMENOPHYLLUM JAVANICUM* (*Spring*). Trees in woods, Padang.

299. *HYMENOPHYLLUM DENTICULATUM*, Sw. On trees in the woods, Padang.

*300. *TRICHOMANES PALLIDUM*, Bl.; Ridl. *op. cit.* p. 733; *antea*, p. 61. Under rocks, in damp spots, Padang streams and woods.

*301. *TRICHOMANES DIGITATUM*, Sw.; Ridl. *op. cit.* p. 333. Woods on the Padang.

*302. *TRICHOMANES PLUMA*, Hook.; Ridl. *op. cit.* p. 333; *antea*, p. 61. Common under banks and rocks and in woods in damp spots to 5,600 feet.

*303. *TRICHOMANES APIIFOLIUM*, Presl; Ridl. *op. cit.* p. 334; *antea*, p. 61. Woods near the Teku.

Distribution. Malay Isles, Polynesia, and Mt. Ophir.

*304. *TRICHOMANES RADICANS*, Sw., var. *KUNZEANUM*, Ridl. *op. cit.* p. 334. Woods near the Teku, Gunong Tahan, 4,600 feet.

305. *TRICHOMANES DENTICULATUM*, Bak. Damp woods, Gunong Tahan.

*306. *HUMATA PEDATA*, Sm.; Ridl. *op. cit.* p. 334. Rocks in the streams at 9th Camp. Ridges below the Gully.

Distribution. Common at all elevations in the Peninsula, Malay Isles, India, Ceylon, and Mascarene Isles.

307. *PROSAPTIA EMERSONII*, Presl; *antea*, p. 61. On trees in the wood behind the Camp.

Distribution. Indo-Malaya.

*308. *LINDSAYA CULTRATA*, Sw.; Ridl. *op. cit.* p. 334. Common on banks, especially at the Camp stream.

*309. *LINDSAYA SCANDENS*, Hook.; Ridl. *op. cit.* p. 334. Woods by the Teku, 4,600 feet altitude.

310. *LINDSAYA ORBICULATA*, Lam. Banks of streams on the Padang.

*311. *LINDSAYA RIGIDA*, Sm.; Ridl. *op. cit.* p. 334. Banks of streams on the Padang.

312. *PTERIS AQUILINA*, L. Only seen close to the Camp houses, near Wray's Camp; Padang Camp, and the top of Gunong Tahan, 7,186 feet altitude.

It was curious that the only plants of the bracken seen were under or actually in contact with the Camp houses.

The form here was usually the softly woolly one usually met with at high altitudes.

*313. *PLAGIOGYRIA EUPHLEBIA*, Kze. Common in woods and on banks of all the streams, often attaining a large size. Collected also by Robinson and Wray in the expedition of

1905; these specimens were rather dwarfed and looked somewhat distinct, but they were obviously not fully developed.

Distribution. India, Japan, Australia, and Perak Mountains.

314. *ASPLENIUM LUNULATUM*, Sw. Teku woods at 4,600 feet.

Distribution. India and Perak.

315. *DIPLAZIUM SPECIOSUM*, Mett. Dense woods by the first Padang stream and Teku woods.

Distribution. Indo-Malaya.

316. *LASTRÆA ARISTATA*, Moore. A clump at the base of rocks in the valley of the first Padang stream. This has quite the habit of a *Davallia* with a long ferruginous hairy rhizome. It much resembles a specimen from Mt. Matang, Borneo.

New to the Peninsula.

*317. *DIPTERIS HORSFIELDII*, Br.; Ridl. *op. cit.* p. 334. Abundant on the ridges between Wray's Camp and the Padang. Common also in woods and on stream-banks on the Padang to 5,600 feet.

Distribution. Common at high altitudes and on the sea-coasts in the Peninsula, also the Malay Islands and Polynesia.

318. *DIPTERIS LOBBIANA*, Hook. In dense masses by the Tahan River and also at the mouth of the Camp stream where it joins the Teku.

Distribution. Hills of the Peninsula and Borneo.

319. *DIPTERIS QUINQUE-FURCATA*, Christ. On rocky and sandy banks of the Teku near the mouth of the Camp stream, local, a single patch. New to the Peninsula, native of Borneo.

I have only seen the description of this striking fern in the 'Ferns of Malaya' by Christ.

It had a stout rhizome, $\frac{1}{4}$ inch through, covered with a dense coat of closest black subulate hairs; stems over two feet tall, glabrous, except at the base, more than $\frac{1}{2}$ inch through; lamina 6 inches long and wider, coriaceous, bifurcating thrice, cuneate at the base; ultimate segments linear, acuminate, subacute; main nerves forming square areolæ; the reticulations less conspicuous. Sori circular, 1 to 5 in the centre of an areolus. The sori are fewer than in the original description, but otherwise the description fits this plant well.

320. *LASTRÆA VISCOLOA*, Bl. Common in the Gully and damp peaty spots just below Bukit Bandera (*L. Ridleyi*, Christ MSS.)

Distribution. Mt. Ophir, Tahan River, Selangor and Perak Hills.

*321. *OLEANDRA NERIIFORMIS*, Cav.; Ridl. *op. cit.* p. 334. Common on the ridges above Wray's Camp.

322. *POLYPODIUM HIRTELLUM*, Bl. A large form on trees in woods, Padang.

Distribution. Mt. Ophir, Perak Hills, Ceylon, and Malay Islands.

323. *POLYPODIUM PARASITICUM*, Mett. Rare on trees near the Camp stream.

Distribution. Mt. Ophir, Penang Hill, and India.

*324. *POLYPODIUM CUCULLATUM*, Nees; *Ridl. op. cit.* p. 334. Common on trees in the Padang Woods.

Distribution. Mt. Ophir, Kluang Terbang, Pahang, Selangor, and Perak Hills, also Ceylon.

*325. *POLYPODIUM STREPTOPHYLLUM*, Bak.; *Ridl. op. cit.* Common on trees and rocks, Padang.

Distribution. Malay Peninsula.

326. *POLYPODIUM MALACCANUM*, Bak. Woods on the Padang.

Distribution. Mt. Ophir.

327. *POLYPODIUM SUBPINNATIFIDUM*, Bl. Woods near the Padang.

This form I have also collected on the Semangkok Pass. It was first identified by Dr. Christ as *P. trichomanoides*, a species which, however, does not occur here.

*328. *PLEOPELTIS WRAYI*, Bak.; *Ridl. op. cit.* p. 334. On trees on ridges near Bukit Bandera.

Distribution. Pahang and Perak Hills.

*329. *PLEOPELTIS STENOPHYLLA*, Bl.; *Ridl. op. cit.* p. 334. A very narrow form.

Trees on the ridges below the Gully. Common in our Hills.

330. *PLEOPELTIS INCURVATA*, Bl. Open woods on the Padang.

Distribution. Mountains of Selangor and Perak, also Malay islands.

*331. *PLEOPELTIS LACINIATA*, Bl. Terrestrial open woods near the 9th Camp.

Distribution. Perak Hills.

*332. *VITTARIA FALCATA*, Kze.; *Ridl. op. cit.* p. 334. Common on trees in the Padang woods.

Distribution. Mountains of Selangor, Malacca, and Perak.

333. *ELAPHOGLOSSUM DECURRENS*, Bl. Terrestrial, in deep moss in woods on the Camp stream, local. New to the Peninsula.

*334. *ELAPHOGLOSSUM LAURIFOLIUM*, Bedd. On trees above the Gully. Also obtained by Robinson in 1905.

335. *POLYBOTRYA APPENDICULATA*, var. *SUBINTEGRA*, Web. Woods by streams on the Padang. Form with the leaf-margins quite entire.

336. *CHRYSODIUM BICUSPE*, Hook.; *antea.* p. 62. Under and on dry rocks, by the Camp stream, and by the upper part of the Teku.

Distribution. Mt. Ophir, Taiping Hills, Java, and Formosa.

*337. *SCHIZÆA MALACCANA*, Bak.; *Ridl. op. cit.* p. 335. Very common on rocks in woods, or on stream-banks all over the district; a rather short thick form.

Distribution. Mt. Ophir, Kedah Peak, and Malay Peninsula generally.

LYCOPODIACEÆ.

338. *LYCOPodium CERNUUM*, L. A very curious, stiffly rigid form occurs on the dry parts of the Padang.

*339. *LYCOPodium CASUARINOIDES*, *Spring.*; *Antea* p. 62. Common in the woods and occasionally creeping over rocks from 4,000 feet to 5,600.

340. *LYCOPodium CEYLANICUM*, *Spring.* On stream-banks by the Teku and in other spots, attaining the height of a foot and branched.

341. *LYCOPodium REFLEXUM*, Lam. Banks of Teku stream at 4,600 feet elevation in wooded spots.

342. *LYCOPodium CAROLINIANUM*, L. Common on damp spots on the open Padang, with bright green creeping stems, sending up fruiting shoots as much as 6 inches tall. The plant exactly resembles a specimen from Missouri, North America, collected by Tracy, in the Singapore herbarium. New to the Peninsula.

Distribution. Africa, Ceylon, New Guinea, China, N. and S. America.

343. *SELAGINELLA SUBEROSA*, *Spring.* In the Teku woods.

344. *SELAGINELLA PINANGENSIS*, *Spring.* Banks of streams near the Camp.

345. *SELAGINELLA OLIGOSTACHYA*, Bak. Gunong Tahan (*Robinson.*)

346. *SELAGINELLA ALUTACEA*, *Spring.* Teku woods on damp banks.

347. *SELAGINELLA ACUTANGULA*, *Spring.* Woods, Gunong Tahan.

348. *SELAGINELLA POLITA*, n. sp.

Stem ascending, 6 to 8 inches, nude, rough with persistent leaf-bases, pale yellow; branches about 4 inches long, little-branched, suberect. Leaves of the main stem oblong-lanceolate, apex rounded, spaced, deciduous; of lower plane lanceolate to ovate-lanceolate, base broad, apex rounded, imbricate, texture firm, polished, dark green above, a little paler beneath, leaves of upper plane half as long, lanceolate, long-cuspidate, paler. Spikes $\frac{1}{2}$ to 1 inch long, slender. Bracts of lower plane triangular, acute, small, and pale; of upper plane subtriangular, quite obtuse, dark green. Sporangia large, globose.

Woods by the Teku, Gunong Tahan.

Nearest to *S. suberosa*, but smaller and denser, and little-branched; leaves rigid, polished and not ciliate. The habit of the plant is more that of *S. trichobasis*,

XIV. SOME NOTES ON ABORIGINAL TRIBES OF UPPER PERAK. (Plates XXXI—XXXIV).

By IVOR H. N. EVANS, B.A., *Assistant Curator and Ethnographical Assistant F.M.S. Museums.*

The following observations were made among three aboriginal tribes during an expedition to Upper Perak in March and April of 1915. The tribes visited were the Semang of Grik, the Orang Jehehr of Temengoh, and the Hill Sakai of the main range, the particular sections of the last-named tribe met with living close to the bridle path which runs from Temengoh to Lasah in Ulu Plus. I here deal with each tribe separately and in the order given above.

THE NEGRITOS OF GRIK. (Plate XXXI, Fig. 1).

The Negritos of Grik appear to be absolutely similar to those of Lenggong, whom I have already described in a former number of this Journal.* I purpose therefore to say but little about them here, with the exception of setting down any information which I did not obtain at Lenggong. It has, I think, been customary to look upon the Negritos or Semang of Grik as being of purer race than those of Lenggong, and, indeed, in the article on the Lenggong tribe I myself spoke of "the pure Semang of Grik †." The Grik people told me that some of them are related to individuals of the Lenggong, Gelok, and Kuala Kenering communities, but I gathered they do not hold very much intercourse with them. The Malays call these small bands of Semang from Lenggong to and beyond Grik, *Sakai Jeram*. They speak a Sakai, i.e., non-Semang dialect, and are of fairly pure Negrito stock.

In my former paper on the Semang of Lenggong I stated, on evidence obtained from the Negritos of Ijok, ‡ that the Lenggong tribe called themselves *Semark Blum*. This information is perfectly correct, but I find (from what I learnt at Grik) that the translation of the name which I gave, i.e. men of the big (water), is not. *Semark* in the first place does not appear to mean men in general (homines), but is used in reference to the aborigines only; secondly, *Ong Blum*, which I translated "big water," is as far as I can make out the aboriginal name for the Perak river, which presumably rises not far from the Blum district in Upper Perak. *Ong Blum*, therefore, means the Blum River (or water), and *Semark Blum*, the aborigines of the Blum. Of course the Perak river is to them *the big river* (or water), hence, I imagine, the mistake.¶ The

* Journal F.M.S. Museums Vol. V, No. 2, 1914.

† I had not then visited them.

‡ See also "Notes on the aboriginal inhabitants of Ijok," Journal F.M.S. Museums, Vol. V, No. 4.

¶ "The big Perak river" would, they said, be "*Ong Blum chekah*."

Grik Semang gave me to understand that the word which they used for people in general (homines) was *Gob* and the following examples showing its use.

Gob Semark.—One of themselves: i.e. a Negrito.

Gob Peletau.—A white man.

Semark Plek (or *Pleh*), however, is the name given to the Hill Sakai, so, as I have stated above, Semark in their dialect means any kind of aboriginal. A rather curious point is that the word *Gop* or *Gob* seems to be used among some tribes of aborigines to denote the Malays only, for instance the Sakai of Sungkai call the Malays *Gob* or *Mai Gob*, the word they use for men (homines) being *Mai*.

The Semang of Grik, like the Jehehr, whose custom in this respect I describe below, use the blood-throwing ceremony when frightened by a thunderstorm, and say to the thunder spirit "*Dayah hog di baling*." This they told me means "Take up the blood," but, if *baling* has the same meaning as in Malay, I should guess that a more correct translation would be, "Take up the blood that we throw you." Children are forbidden to play about in the water, as it is supposed that this would cause a thunderstorm.

At burials the Semang say to the spirit of the deceased "*Du! Du! Yak!*," which they told me means "Go! Go! Hear!" i.e. "Go your way! Hear our command!"

THE ORANG JEHEHR OF TEMENGOH.

(Pl. XXXI Fig. 2, Pl. XXXII Fig. 1.)

This tribe, which speaks a Semang dialect, appears to be of fairly pure Negrito blood. The hair of many individuals, though not all, is typically woolly, and, with one exception, the skin colour in all that I met, was extremely dark. The type of features, however, varied to some extent, as did the character of the hair, and while it was easy to pick out individuals who in both respects were typically negritic, mixed types were observable, some of whom had straight or wavy hair, and other features which were decidedly not Negrito, but Sakai. As on first acquaintance, and also to a less extent later, they were inclined to be rather nervous, I thought it better not to attempt to take any physical measurements, a performance which was likely to be regarded with considerable suspicion. A fair number of ethnographical specimens were purchased for the Perak Museum; and for the smaller articles, silver ten cent pieces were in great demand. In the matter of money the Jehehr are still very unsophisticated, and when I had to pay more than a dollar for specimens, I had the greatest difficulty in getting them to accept notes, their constant request being for silver dollars, as they said that they did not want, or understand, "tree leaves." One man to whom I paid two dollars in ten cent. pieces was quite uncertain how many he ought to receive. Needless to say, the local Malays

frequently take advantage of the Jehehr's guilelessness. Among the Jehehr, as among other Negrito tribes of the western, and I believe, most of those on the eastern side of the Peninsula, the hair of both sexes was cut short or the head shaved, but in many cases a small top-knot was left, which they adorned with sweet-smelling leaves or other ornaments.

Annandale places the Jehehr in the Sakai section of his notes on the aborigines of Upper Perak* though he himself says: "The first two tribes to be dealt with under the heading† are so closely related to the Semang stock, that the wisdom of separating them from it may be doubted. It is hardly controversial to state that they are Semangs with a slight admixture of either Malay or Sakai blood, supposing that it is legitimate to speak of a definite Sakai *race*, which is very doubtful at the present stage of our enquiry. Still, it has seemed better to make the division, seeing that the differences, though inconspicuous, most certainly exist, and that the tribes of Upper Perak, other than Séman‡, include persons among their numbers whose hair is nearly straight and whose complexion is very much paler than chocolate."

There is certainly truth in these observations, still, if we take into consideration the three characters of hair, skin colour, and features, the Jehehr are, according to my mind, very distinctly Negrito. It is but seldom that an individual can be found (I can only remember one) in whom two out of the three characters are not negritic, and, though there is no doubt some slight admixture of foreign blood in the tribe, probably few people, if they were shown a group of Jehehr, would hesitate in saying that they were Negritos. Furthermore, though language is in itself admittedly not a fair criterion of race, yet the Jehehr *do* speak a "Semang dialect;" (i.e. one in which the words given by Skeat as distinctive of Semang dialects occur). Now, though instances of Negrito tribes speaking Sakai dialects are well known (e.g. the tribes of Grik and Lenggong) I do not ever remember having heard of a case in which a Semang dialect had imposed itself upon a Sakai tribe.

An account of the dress and ornaments worn by the Jehehr has already been given by Annandale¶, and to this I can add very little fresh information. One man seen was wearing rather a curious crown-like head-dress made of strips of pandanus leaf, coloured yellow, interwoven with *akar* or *urat batu*. The nasal septum was pierced in the majority of the men, the operation being, the Jehehr told me, performed with a porcupine quill, porcupine quills being also frequently worn through the hole as an ornament. Annandale mentions that the young shoots of some zingiberaceous plant were used

* Fasciculi Malayenses, Anthropology p. 22.

† The Jehehr is one of the two.

‡ Skeat's Pagan Races, Vol. 11, page 390.

¶ Fasciculi Malayenses, Anthropology p. 27.

for the same purpose, but I did not notice this. Tattooing was observed on one man and one woman, but I do not think that the practice is truly native to the Jehehr, and in the case of the man he told me that it had been done by Hill Sakai, among whom as I shall point out later, I found a very large percentage of individuals with tattoo marks. The tattoo patterns on the woman consisted of two parallel and vertical lines running from the top of the forehead to the tip of the nose, those on the man of two similar lines from the top of the forehead, but terminating on the level of the eyebrows. The chief weapons in use among the Jehehr are blow-pipes, bows and arrows, and spears. Skeat has described very fully various bows, arrows, and quivers from Upper Perak,* so I do not propose to enter into these matters at any great length here; but I will record shortly a few points worth mentioning concerning them, under the section of this paper which deals with the Sakai of the hill district, since the bows and arrows purchased from these people were identical with those obtained from the Jehehr, with the single exception that the Jehehr quivers were quite plain, while those of the hill people were decorated with patterns.

Annandale states that the Jehehr make neither bows and arrows nor blow pipes, but obtain these articles from the Hill tribes, yet the Jehehr told me that they made both, and were capable of hammering out scrap iron into arrow-heads. I did not, however, see any forges in the Jehehr's camps as I did among the Hill Sakai. With regard to the blow-pipes purchased from the Jehehr, out of four specimens, three have an apple-shaped mouth-piece of *damar kelulut*, the remaining example a wooden mouth-piece of the same shape; otherwise they are similar to those of the Hill Sakai which I describe below. The same thing holds good for the quivers for blow-pipe darts, except in one case where I obtained a specimen of the true Negrito type of dart quiver, i.e., a coverless receptacle consisting simply of an internode of bamboo with a node left at one end to form its bottom. This quiver was ornamented with rudely scratched-in patterns. Sometimes numerous strips of rattan leaf are put into the quivers with the idea of keeping the darts apart. In no case that I saw were the dart-stems notched above the poison, in order that the point might break off in the wound, when an animal was struck.

Two Jehehr settlements were visited, one of which, on a hill above Kampong Temengoh, was a single tree-dwelling. This was a hut supported on eight small trees, with the floor about fifteen feet above ground-level. Small trees growing together in the most advantageous manner possible had been selected to support the dwelling, and the house was built among their slender trunks much as a bird's nest is built between the twigs of a branch. Access to the hut was obtained by a ladder of several saplings placed side by side. Near Jeram Subang

* Pagan Races, Vol. 1 p. 270-278.

on the Temengoh River, and some five or six miles below Temengoh village, I paid a visit to a shelter, or rather assemblage of shelters, which was much more typically Negrito. This camp consisted of eight screens of attaps placed roughly in a circle, and arranged so that the "roofs" nearly met in the centre, while enclosed within the circle were the boles of two fairly large trees. One or more bamboo sleeping-platforms was to be seen under every shelter, and a fire, at which the Jehehr not only cook their food, but warm themselves at night, was smouldering close to each platform. This type of habitation was exactly similar to those I had seen on a former occasion among the Semang of Lenggong.

In reaching the settlement just described, I had to pass through two clearings of considerable size. The first of these was deserted, but the second, although the padi crop had been reaped, still afforded the Jehehr some bananas, some brinjals and other vegetables. In this second clearing was a small watcher's hut, built in a commanding position, and raised on very high posts. On one side of the clearing and not far from the jungle, was a house built on posts in the usual Malay (or Sakai) fashion, but this had been abandoned, after the harvest, in favour of the ground shelters already described, which were in the jungle.

As far as I could gather, the Jehehr have practically no religious beliefs. Souls after death, according to their statement, went to dwell by the edge of the sea, and they seem to be afraid that the spirits of the dead may linger near the huts of their relatives and trouble them, since they told me, that when a corpse is being buried they say "*Rai! Dun! Dun! Dun! Di-prak!*" which they said meant "Dig! Leave! Go!" I was also told that offerings of food were placed on the graves. Two kinds of grave-ghosts, not, it seems, spirits of the dead, are much feared, these being named *Kemoid* and *Sara*. I could obtain no evidence that there was any belief in a Supreme Being, though the Jehehr, are certainly, exceedingly afraid of thunder (*kare*), as are most of the aboriginal tribes, but though thunder, according to Vaughan Stevens, is the Semang supreme god I could find nothing to show that it was so regarded by the Jehehr, yet it is certainly thought to be caused by a powerful spirit, who may be appeased by an offering of blood.

The Jehehr said, that when a thunderstorm came on, they cut the outside of the calf of the right leg near the shin-bone with a knife, and taking a few drops of blood from the wound on the knife blade, and putting them into the palm of the left hand, threw them up into the air saying, "*Haroid! Saidth!*" (Throw it away! Sleep! (?)). Various actions are tabu, as they are supposed to bring on thunderstorms, which may involve the death by lightning (*chilou*) of others, as well as of the transgressor. For instance it is tabu for anyone to kill a millipede, to shoot an owl with blow-pipe, or to flash a

looking-glass or other shining object about in the open, and for the same reason it is tabu for a man to have intercourse with his wife during daytime.

An attempt is sometimes made to drive away a threatening storm by blowing through the teeth with a hissing sound—"Hish." The ideas of the Jehehr with regard to the lunar eclipse, which they call *Kenod bulan* are similar to those of the Semang of Ijok. They believe that the moon is attacked by a butterfly which attempts to swallow it. The Jehehr frighten away the butterfly by making music with bamboo stampers.

It is curious to note that among most, if not all, the aboriginal tribes of the Peninsula the spells of the magician are performed within a magic circle. In some cases a round hut of leaves is erected in which the magician ensconces himself, in others merely a round frame with hangings is used. The Jehehr told me that they too made use of the round hut or *bumbun*.

The custom of avoidance of the mother-in-law seems to be very strictly in force, since she may neither be named, or spoken to, by her son-in-law.

Some articles of diet are tabu to the women, it being considered that the infringement of the tabu would cause the offender to suffer from convulsions (*sawan*). The flesh of the *plandok* or chevrotain is rigidly tabued, but though, to a lesser extent, the meat of the sambhur (*Cervus unicolor*) and the muntjac (*Muntaicus muntjac*) are also tabu I was told that some women were not afraid to eat it. It looks rather as if these tabus might have arisen from the desire of the men to reserve the rarer and most savoury items of diet to themselves.

As far as I could gather, there appears to be little or no marriage ceremony. The Jehehr said that it was allowable to have two wives, but not usual.

A man who wishes to marry takes a wife from another settlement (the girls of marriageable age in his own will probably be all his near relations) and brings her back to his own camp. After a while, however, he returns to live with his wife's relatives for a time, and visits are paid to them at varying intervals.

A woman is forbidden to eat certain articles of food for four days after giving birth to a child,; these are the cabbages of palms, flesh and fish, and tubers.

Names of children are usually taken from the river, or small streams, nearest to which they are born, or from rapids or promontories, but they are also given from the kind of tree under which the birth takes place. The following list of Jehehr names is, I think, fairly representative.

Name.

Chermin derived from *Sungei Chermin*, the Chermin River.

| | | | |
|---------|---|---|---|
| Lek | „ | „ | <i>Chegar Lek</i> , Lek rapid. |
| Rambai | „ | „ | <i>Tanjong Rambai</i> , Rambai Tree Point. |
| Kunyet | „ | „ | <i>Pokok Kunyet</i> , Turmeric. |
| Langsat | „ | „ | <i>Pohun Langsat</i> , The Langsat Tree. |
| Eseng | „ | „ | <i>Sungei Eseng</i> , The Eseng River. |
| Kepah | „ | „ | <i>Sungei Kepah</i> , The Kepah River. |
| Chuit | „ | „ | <i>Sungei Chuit</i> , The Chuit River. |
| Ka'un | „ | „ | <i>Sungei Ka'un</i> , The Ka'un River. |
| Darah | „ | „ | <i>Jeram Darah</i> , A Large Rapid in the Temengoh River. |
| Lanah | „ | „ | <i>Tanah Lanah</i> , A piece of land called Lanah. |

The so called rivers in the above list are, I believe, in most, if not all cases, quite inconsiderable streams, and I have been unable to trace them on the map. The aboriginal tribes of the Peninsula have names for even the tiniest streamlets.

THE HILL-SAKAI (Pls. XXXII—XXXIV.)

The Hill-Sakai, seemingly the same as the Po-Klo of Messrs. Annandale and Robinson although I did not get this name for them—occupy, according to their own accounts, the slopes of the main range, both on the Western and Eastern sides. One of their headmen told me that the extreme boundary of their tribe northwards along the range was the Pergau, a tributary of the Kelantan River. "Beyond this," he said, "live the Orang Sabun," but his description of these people was so hazy that I was unable to obtain any idea as to whether they were Negritos or Sakais. The Kinta River was stated by the same man, to be the southern boundary of the tribe, while locally, in the neighbourhood of Temengoh, the dividing line between the territories of the Jehehr and the hill people is, a Malay told me, a river which he called the Keronang, but which I take to be the stream given on the map as the Kerunai, since it is in about the right position. The Jehehr call the Hill-Sakai, who are known to the Malays as Sakai Bukit, *Mendrak Plek* (or *pleh*), but the only thing I could get from the hill people as a tribal name was *Senoi*, and *Senoi* appears to be simply their word for *people* (homines). The Sakai of the Sungkai district also use the word *Senoi* as tribal designation, but if they wish to speak of a white man, a Pahang Sakai etc., they say *Mai puteh*, a white man; *Mai Pahang*, a Pahang Sakai; *Mai Gop*, a Malay. Presuming, as I have already done, that the Hill Sakai whom I met are the same as Annandale's Po-Klo, no doubt he is perfectly right in classing them as Sakai though he seems uncertain whether he should do so, and not as Negritos. He says, however, in speaking of fifteen men who came to Temengoh during his

visit, who were the only members of the tribe he met, that "while the majority of these individuals only differed from the *Seinang of Grik in that they were taller and stouter and did not suffer from skin disease, a few were very considerably paler in complexion, had hair which was straight, and faces of a much less infantile type. Indeed extremes in both directions existed." The photographs given in the Fasciculi certainly show some Negrito types, but as I met, I should judge, about a hundred of the hill people, I had, apart from the fact that I did not take any measurements, a better opportunity of examining these Sakai than Annandale had. Just as, on sight, I should unhesitatingly class the Jehehr as Negritos, so I should place the Orang Bukit among the Sakai. Not that I would for a minute deny that they have a considerable admixture of Negrito blood, for such is obviously the case, as is shown by the occurrence of Negrito facial characters, woolly hair, and dark skins in individuals; but the sum total of the obvious physical characteristics of a large number of the tribe would make me set them down immediately as being much more of the Sakai than Negrito type. Of the Negrito characters which occur, I should say that hair with a tendency to ulotrichy and childish facial appearance were commoner than dark skin colour. As a tribe, however, these people are distinguished as Sakai by comparatively light skin colour, taller stature than that of the Negritos, more regular features, and hair often straight or wavy.

The Hill Sakai, though it might hardly be expected of them, since they live at a distance from Malay villages, are really a good deal more sophisticated than the Jehehr. In the first place I believe that their wits are sharper than those of the Jehehr, and that they have far greater capabilities for adapting themselves to new circumstances. Secondly, the Jehehr, a lazy tribe, hang around the few Malay villages in their neighbourhood and seldom think of going further afield. The Hill Sakai, on the other hand, travel considerable distances, and of those I met, some, and especially the two headmen, were accustomed to visit Sungei Siput and Kuala Kangsar, where they sold rattans gathered in the jungle. Notes were taken in payment for articles bought without the same hesitation that was shown by the Jehehr, and if all the members of the tribe could not tell the difference between a one dollar and a five dollar note, the headmen at any rate could do so, and assured them that they were not being cheated. These two headmen, Toh Raja and Toh Stia, were extremely pleasant and well mannered young men and seemed to possess a very considerable influence over their followers. The latter, as compared with other aboriginal tribes were very independent in their manners and bearing, and were not at all inclined to be ordered about by the Malays, or imposed upon by their brag and bluster. One of my "gembalas†"

* Fasciculi Malayenses, Anthropology. p. 23.

† Elephant drivers.

ordered a Sakai to fetch him some water, and the Sakai, much to the surprise of the Malay turned round and told him that if he wanted water he had better go and get it himself. Several cases are known of the Hill Sakai of this region objecting to the presence of strangers in their territories and ejecting them.

Tattooing, called by the Sakai *chenul*, was observed on the faces of a number of individuals, both on men and women. In no case did I see tattoo marks on any other part of the body. Since, though tattooing has been recorded among the Sakai by various observers, there seems to be some doubt in Skeat's mind as to how far evidence with regard to tattooing was to be believed, I will state here—I have already done so in other cases where I have met with the practice—that in speaking of tattooing I invariably mean tattooing proper, i.e., pricking colouring material into the skin by means of a pointed instrument. Skeat sums up the evidence with regard to tattooing, available at the time he wrote, as follows:

“In spite of this apparently strong consensus of evidence, I must still repeat the warning that (although there is clearly some form of real tattooing, i.e., skin-puncturation, practised in the Peninsula), yet what many of the observers from whom I have quoted, are wont to call tattooing, is certainly no more than sacrifice* or even perhaps nothing but mere face-paint after all.”†

The Sakai told me that the operation was performed with a bertam thorn and soot or charcoal. The resulting patterns were generally rather faint, not very much pigment having been forced in under the skin. In the men the most usual tattoo marks found were three pairs of parallel lines on either side of the face, the topmost line usually running slanting across the face from near the top of the ear to the nostril, the lowest from rather below the ear to the corner of the mouth. In one case a man, besides having this arrangement of tattoo markings, was also ornamented with two parallel lines from the top of the forehead in the centre, to the root of the nose.

In the women the tattoo patterns were generally confined to the forehead, one of the commonest forms being, roughly, a reversed broad arrow composed of three pairs of parallel lines, the centre pair reaching from the top of the forehead to just above the root of the nose, the other two pairs from the top of the forehead to above the eyebrows. One man, in addition to the ordinary cheek pattern, had also this type of forehead design, but the two lines forming the shaft of the arrow were prolonged to the tip of the nose. Several women, whom I saw, had the face stained yellow with some vegetable colouring matter resembling turmeric, which, they said, they obtained from a fairly tall shrub.

The custom of boring a hole in the septum of the nose was common, but not universal: porcupine quills were worn

* I have never yet seen scarification employed.

† Pagan Races: Vol. 2, p. 43.

thrust through the hole. Both men and women among the Hill Sakai wear their hair short, but the latter grow a small tuft at the back of the head like the women of the Semang tribes.

It is not necessary to say very much regarding the dress of the tribe. Malay pattern sarongs or T bandages of European cloth were the usual costume of the men, while most of the women wore short sarongs of red twill which reached from the waist to a little below the knees. Necklaces of beads were in favour among the women, and, to a less extent, among the men, the women's necklaces being long loops reaching to the waist, while the mens' consisted of a string of beads tied tightly round the neck with the long ends hanging down in front. Head-fillets of twisted vegetable fibre were commonly worn by the men. The bamboo combs used by the women were generally decorated with scratched-in patterns, but in one specimen that I saw the outer skin of the bamboo had been partly removed after the Semang fashion. I secured one very pretty little comb which was 10.2 cms. in length, but had a breadth of only 1.7 cms. both the top and the teeth, of which there were seven, being covered with neatly etched patterns. Other objects of dress, which I obtained, were a couple of necklaces, one of small, white seeds, the other of white and black seeds strung alternately, and a crown-like headdress of green and yellow leaves similar in construction to a specimen which I bought from the Jehehr.

Before speaking of the agriculture of the tribe I will give a short description of the only type of house seen. On the journey from Temengoh along the Lasah bridle path Sakai were first met with at Kuala Jinaheng (Jermahing) where we camped out for the night. Their house was not visited, since it was some distance away, and was stated to be only a temporary abode, while I was anxious to push on the next morning to another settlement, said to consist of a single communal house. This house, about which I found the information received to be perfectly correct, was situated on a rising ground near a small stream, and was surrounded by a very considerable clearing. We also passed a similar type of dwelling on a hill above the bridle path after leaving Kuala Jinaheng, but it was newly built, and the Sakai had not yet moved into it from their old clearing, which was a long way off. The communal house, near which I camped for the night, (Pl. XXXIII Fig. 1) was raised on posts to a minimum height of ten feet from the ground; its length was forty-nine, and its breadth nineteen feet. Entry was obtained by a main ladder at one end of the house and a couple of subsidiary ladders against the side walls at the other end of the building. These ladders were constructed of a number of large bamboos or small tree-trunks placed side by side with steps of bamboo or wood lashed across them. A very large amount of bamboo was used in the construction of the dwelling, the rafters,

floor stringers, and many of the supplementary posts were all of bamboo, and sheet bamboo was used for the floors, walling, and for covering the bamboo sleeping benches or platforms. The height between floor and the cross beams (about four feet) was so little that in walking about it was constantly necessary to dodge under timberings. Most of the sleeping platforms were arranged along the walls, but some jutted out at right angles. There was, however, sufficient room left to allow passage from one end of the house to the other. The dwelling contained four earth hearths, these being built close to the sleeping platforms. As far as I could find out, there were no very definitely allotted sleeping places, but the unmarried of either sex were kept apart. The Hill Sakai are hard workers, and, for an aboriginal tribe very good agriculturalists. Each community has several large clearings planted with different crops, but padi does not seem to be grown on the Perak side of the main range. The headman of the village at which I stopped told me that his people had four clearings in use at the time of my visit, one planted with *sengkuai* (millet), two with *ubi kayu* (tapioca) and one with a mixed crop of *kaladi* (caladium) and *keledek* (*Convolvulus batatas*). It appears that the work of clearing and planting is performed by the whole of the settlement in common, and the crops are also common property.

I had imagined, chiefly owing to the size of the house I saw, that the Sakai would probably only have watching huts on the other clearings, and would go to and return from them the same day; hence I omitted to ask them whether they had any kind of dwellings on them, but after my return to Temengoh, the Malay *Gembala Sakai*,* Pak Lebai Ishak, informed me that they usually had a large communal house in each clearing and the whole community moved from one abode to another whenever there was any necessity for doing so.

The tribe plants a fair amount of tobacco, for though I did not come across any growing I saw a considerable quantity, cut into shreds, drying on rectangular frames made of loosely plaited strips of *bemban*. These were placed on the low cross beams above the fire places. The Sakai told me that the tobacco was generally smoked as soon as dry, but occasionally they stored it in joints of bamboo to mature.

With regard to weapons, blow-pipes were of the usual Upper Perak type, i.e. weapons with a one-piece outer tube consisting of a single internode. The mouth pieces, which were of wood, were oblately spheroidal. The outer tube was never sufficiently long to enclose the whole of the inner, which is of course the important part of the blow-pipe, the reason probably being that bamboos of sufficient size and with internodes long enough for the purpose could not be obtained. To get over this difficulty a cylindrical piece of

* Herdsman of the Sakai, a name frequently given to any Malay who has gained authority over the aborigines.

bamboo is pushed over the inner tube just above the mouth-piece. This may be either larger or smaller than the outer tube. If the former is the case, the end of the outer tube is somewhat pared away and the short section fitted over it; if the latter, the end of it is fitted into the outer tube. The only attempts at ornamentation on the blow-pipes externally were annular scratched-in markings below the muzzles and occasionally some slight patterns on the extra bamboo section next the mouth-piece. The dart quivers were all of the usual type of *covered* quiver obtained from Upper Perak, and the Pah and Plus valleys. The main type of decoration is said by Annandale to be derived from the tail of the Argus pheasant, but, as I found that I was given several names for each kind of pattern,—the Argus pheasant was not one obtained,—I ceased making further enquiries. I also took pattern names among the Jehelr with very similar results.

Descriptions of several specimens of bows from Upper Perak having been given by Skeat, I do not think that I can add anything very material to what has already been recorded, but I set down here a few noticeable features with regard to them, and their arrows and quivers. The bows which were of some kind of palm wood, *ibul* or *menhar* (unidentified) were furnished with shoulders at top and bottom. The permanently attached end of the cord was fastened with a knot at one pair of shoulders. The other end was furnished with a loop, which, when the bow was strung, was fitted over the shoulders at the other extremity, and when loose was allowed to slip down the wood. The outer faces of the bows were rounded, but the inner, though somewhat flattened, always had a ridge running down the middle from end to end. The bow is bent for stringing by placing the end at which the cord is fixed on the ground, grasping the other end in the hands and pressing with the knee of the right leg, the wood of the bow being gripped near the ground between the big and second toes.

None of the arrows I saw had detachable foreshafts, as had some described by Mr. Wray. The blades of the arrow-heads were broadly lanceolate, or spatulate, in shape, and furnished with either one or two barbs at their base. A stem of at least 5.5. cms in length, often considerably more, projected from the base of the blade and the end of this was lashed into the bamboo arrow-shaft with a rattan binding, but more than two-thirds of it were left protruding. The notch for the cord across the top of the shaft was in the same plane as the flattened arrow-head, as was also the feathering. This consisted of two long and narrow strips of the tail feathers of a hornbill, fixed to the shaft at their ends with slight bindings covered over with *damar kelulut*, but free along the rest of their length. The part of the shaft to which the feathers were attached was ornamented with incised annular markings. In some arrows these markings extended beyond the lower point of attachment of the feathers. The quivers were made, as is usual, from an internode of bamboo with a node to form the

bottom of the receptacle, a piece of the next internode, sharpened to a spike for planting the quiver in the ground, being left adhering to the node. The arrows were prevented from rattling in the quiver, or from falling out by a plug of leaves pushed down into its mouth between the arrow-shafts, which projected from it to the extent of rather less than half their length. Both the quivers made by the Hill Sakai, which I obtained, were partially ornamented with scratched-in patterns, but one had some of the patterns made more prominent by removing portions of the outer skin of the bamboo and rubbing in brown colouring matter, after the manner of the Negrito tribes.

The Hill Sakai, as I have already stated, have some little skill in forging iron. Outside the communal house there was standing a small thatched shelter, and under this was a Sakai blacksmith's forge. The anvil, or anvils, on which the iron was hammered out were a couple of small boulders with rather concave faces; and the hammer used was an iron spike with a flattened head, hafted to a short handle after the fashion of a native adze (*beliong*). The bellows or apparatus for blowing up the fire consisted of a couple of vertical bamboo cylinders, from the open tops of which projected two slight wooden piston rods. The piston-heads were made by binding a mass of feathers to the end of each rod. The cylinders were lashed to a stake driven into the ground, and further steadied by spikes of bamboo projecting into the ground from the node which formed the base of each. The air was delivered from the cylinders to the hearth by two bamboo tubes issuing from their base. The apparatus was exactly similar to one in the Perak Museum collected by Mr. L. Wray in the Piah Valley, and is of a type found throughout the Indo-Malayan region. Two or three half-completed spear-heads, which had cracked in forging and had been thrown aside as useless, were lying about near the forge. Iron for making spear and arrow-heads is, of course, obtained from Chinese or Malay traders. Fish-spear heads are also made by Sakai blacksmiths and one kind of which I purchased a specimen, deserves description in detail. This implement, 18 cms. in length, was composed of four fine bars or strips of iron, bound together at the "tang," or end which is inserted into the shaft, with a strip of rattan-cane. This "tang" is exceedingly clumsy and measures as much as 2.5 cms. in breadth below the base of the blade proper, but tapers towards its other end owing to the fining out of the iron bars of which it is composed. In the blade the two outer strips are bent at the base so as to separate them from those in the centre: the latter are slightly bent apart at their tips. The spear-head looks a very inefficient implement, but in spite of this, I saw fish each of about three pounds weight, which had been obtained with fish-spears of this type. Barbed fish-spears like those of the Malays (*serampang*) were also used, and the Sakai told me that these too were of their own manufacture.

The time spent with the "Sakai Bukit" being very short,—one night at Kuala Jinaheng on the way out, a night and parts of two days at the communal house, and another night at Kuala Jinaheng on the return journey,—I naturally could not gather a great deal of information with regard to their inner life; such details, however, as I was able to obtain are set down below.

I could get no evidence that there was any belief in a Supreme Being, that they had any legend of the creation of the world, or of an existence after death. One Sakai, when asked what happened to the souls of the dead, replied that he did not know, but anyhow the body just went rotten.

As among the Sakai of the Batang Padang District of Perak, the shamans of the tribe are termed *Halak*, and the shaman's familiar spirit is called his *Anak Yang*.

Like the Jehehr, and other aboriginal tribes, both Negrito and Sakai, the hill people appear to be very much afraid of thunder and lightning.

It appears, that, as is also the custom of the Sakai of the Ulu Sungkai, should a child have been teasing, or playing with a cat or a dog, and a thunderstorm come on shortly afterwards, the child's mother cuts off a piece of its hair and going outside the house places the piece of hair on the ground and beats it with a club or stick. It is tabu to flash any glittering object about in the open since it is thought that this would bring on a thunderstorm, and the house would be liable to be struck by lightning.

On the night I passed at the communal house at Lanag I asked the Sakai to arrange to have a musical entertainment—I have said something about this elsewhere,—and suggested that the performance might be held in the open near the house. To this suggestion they demurred, and though they could not, or would not, state their objection very precisely, I understood that they thought that if they were to hold the entertainment in the open, their singing would cause mists to gather round them which would engender sickness.

The Hill Sakai told me that, on a death occurring, they buried the body and did not desert either their clearing or house. On the other hand the Jehehr, in talking about them afterwards, said that the hill people not only deserted the house, but left the corpse unburied in it. As I had no opportunity of investigating the matter further since this occurred after my return to Temengoh from my visit to them, I asked Pak Lebai Ishak who is local Malay Gembala of both the Jehehr and Orang Bukit what he could tell me about the matter. He replied that he had seen graves on hill tops at some distance from the clearing, but he seemed to think that the body might be occasionally deserted as the Jehehr said.

The avoidance of the mother-in-law is strictly observed and it is forbidden to speak to her, to pass in front of her, or even to hand anything to her.

There seems to be some prejudice against a man mentioning his own name, but it can scarcely be said to amount to a tabu.

When a woman is about to give birth to a child a small hut is built on the ground, and in this the event takes place. For three days after her delivery the mother may not eat rice or fish; *sengkui* or *ubi* are allowable.

The flesh of the sambhur, the muntjac or wild pig is not eaten by women, as it is thought that it would cause sickness either in themselves or in their children.

Toh Stia told me that it was customary to take the *semangat sengkui* (soul of the millet) and that the ceremony was performed by an old woman. On the first day of the proceedings, before reaping had been begun, she went into the crop and cut about a gantang measure of the sengkui heads, and, on the second day, she again took the same amount. On the third day no reaping might be done, but on the fourth harvesting was started. Flowers, water and sireh were placed near the *semangat* which was hung up in the house. The *semangat* was finally mixed with the grain reserved for seed purposes.

The lunar eclipse is thought to be caused by an animal, or spirit, called *Pud*, which swallows the moon.

The custom in force among many Sakai tribes of never going out into the jungle with any craving unsatisfied, which I have referred to in previous papers on the Sakai of the Ulu Sungkai and on the Aborigines of Negri Sembilan, is also observed by the Sakai Bukit. Thus it is thought that if a Sakai were to start on a journey without chewing sireh, though he had wished to do so, some misfortune would be sure to overtake him.

The same belief (the evil effects following the breakage of the custom being called *kempunan* *) seems to be held by the Malays of Upper Perak and other districts. In connection with this belief the Sakai mentioned the word *shelentap*, and though I could not definitely find out its meaning—they said *shelentap* means "there is not"—it may possibly be equivalent to the *kempunan* of the Malays.

In marriage exogamy is usual, but not invariable, since whether or not a man takes a wife from another community partly depends on the presence or absence of girls of marriageable age and of a sufficiently distant degree of consanguinity in his own settlement. As far as I could ascertain, first cousins are within the prescribed degrees, but second cousins are not. When exogamy takes place the husband very frequently goes to live with his wife's family. This was so in the case of Toh Stia, a Sakai from the Plus River, who on my

* A Johore Malay, whom I recently questioned about the meaning of the word *Kempunan*, immediately said "going out without having eaten something you wanted to." Wilkinson translates the word as a "dilemma."

arrival was acting for Toh Rajah the real headman, his brother-in-law, who had gone over the main range into Kelantan.*

It is allowable to have two wives, but I gathered, not very usual. Children appear to be named from the place (the Malay word used was tanah) at which they are born. This would, I suppose, usually be the clearing on which the community was living in at the time of the event.

The musical entertainment, which I have mentioned above, was given by a small party of young men and women on the night I spent at the Hill Sakai's house.

As is usual at such gatherings the performance went on till day-break, but I only stopped to hear it for a couple of hours. The songs, which were not unmusical, were accompanied by the women with bamboo stampers, one of which they grasped in either hand. The words of the song were given out line by line by one of the men and followed by the others. Toh Stia made an attempt to tell me what the performers were saying and I gathered that the song was almost without meaning, the Sakai merely mentioning the names of mountains and rivers, saying that they felt very hungry, and proclaiming that "there was a boy who rode a horse" and other equally interesting items of intelligence.

* Toh Rajah returned from his wanderings while I was at the settlement.

XV. THE NATURAL HISTORY OF KEDAH PEAK.

By H. C. ROBINSON, C.M.Z.S., M.B.O.U., and
C. BODEN KLOSS, F.Z.S., M.B.O.U.

I. INTRODUCTION.

Kedah Peak, or Gunong Jerai, to use its Malay name, is a familiar landmark to all voyagers through the Straits of Malacca, dominating as it does the roadstead of Penang.

It is situated about 22 miles NNE of Penang with its summit about 6 miles from the sea and according to the latest computations attains a height of 3,976 feet being, if we except the Bintang Range on the Perak border, considerably the highest mountain in the State of Kedah. It is quite isolated, standing on a base that does not exceed 50 square miles, and is separated by low land not exceeding 50 feet in elevation from all other hills. Its slopes to the north and west are much steeper than those to the south and east and vertical rock faces, many hundreds of feet in height, exist. Geologically the mountain appears to consist of sandstones and quartzites of varying degrees of hardness, traversed by veins of quartz, while in one or two places deposits of haematite are found. It is well watered, being cut into by three great valleys which have been utilized for a water supply to the neighbouring districts and the cliffs are ornamented in several places by cascades which are very conspicuous after wet weather of any duration.

On the lower slopes the forest is now poor, timber cutting having been, until the last few years quite unrestricted, but a good deal of Meranti (*Shorea* and *Hopea* spp) is found up to about 2,000 ft., while Medang (*Lauraceae*) is also abundant. There is but little hard wood except in the first two or three hundred feet where it has almost all been cut out, and but little *jelotong*. We saw no taban of any kind. The stemless palms are by no means numerous and the forest generally is dry and with but little undergrowth.

On the Eastern side above about 1,800 feet where timber cutting ceases, the character of the forest changes and on the ridges great numbers of orchids begin to appear. Conifers, *Agathis*, *Dacrydium* (spp.) and *Podocarpus* are abundant and large shrubby *Rhododendrons* with salmon, lemon-yellow and white flowers begin to show themselves. In the damper hollows and among rocks near the streams a scarlet *Balanophora* was very abundant. Many of the ridges and flatter areas from 2,500 feet to the summit were clothed with a zerophitic vegetation, amongst which *Boeckia frutescens*, *Tristania*, *Leptospermum* and *Vaccinium* were the commonest shrubs, while in damp hollows amongst the rocks and amongst the coarse grasses and sedges that covered the more open spaces *Burmannia longifolia*,

a Purple and a Yellow *Utricularia* and two species of *Xyris* were very conspicuous. Melastomaceous plants and Begonias, in contradistinction to the flora of the Perak main range, were by no means common and only two or three species of gingerworts were met with. We did not see a single tree fern.

Collections were made in all groups of the animal kingdom and rather over two hundred species of flowering plants were obtained amongst which was an unusually large proportion of orchids. Very many species however were not in flower or in fruit at the time of our visit and it was therefore impossible to obtain identifiable specimens. This was especially the case among the *Gesneraceae*, of which about a dozen species were noted.

Animal life was extraordinarily poor, not only in species but also in individuals, and the only group represented by large numbers of specimens is the Lepidoptera Heterocera, of which considerable series were obtained by the use of a Lux lamp at night. In other groups the Millipedes were perhaps most abundant, though the number of species was not large. All orders of day flying insects were extremely scarce.

The most interesting capture of the trip was a specimen of *Eoperipatus* secured by a collector belonging to Dr. R. Hanitsch of the Raffles Museum, Singapore, who accompanied us. A single specimen was obtained in rotten wood at about 2,900 ft: though diligently searched for by ten other collectors for a day no other specimens were met with. The collections as worked out will be published group by group in this Journal. In the present number lists are given of the vertebrates.

Owing to the fact that there is now a railway station at its eastern foot, Kedah Peak has become very accessible and it is one of the easiest mountains to ascend that we have visited. From a practical point of view perhaps the most interesting feature attaching to it is that at about 3,300 ft. there exists a far better site for several hill bungalows than we know of at any similar altitude in the Peninsula.

The ascent from Gurun Station to Padang 'toh Seh, 3,200 ft., takes about three hours and the return journey about half that time. For the first two thousand feet the going is excellent in dry weather, a smooth and broad track having been formed by the extraction of baulks of timber drawn by buffalo, but as the subsoil is clayey this road becomes very slippery after rain though it is nowhere steep.

Between 1,500 ft. and 2,500 ft. there are an unusual number of flat spaces or slightly rounded ridges such as we have noted nowhere else and to this altitude the forest is open, with but little undergrowth.

Padang 'toh Seh is an open, somewhat rocky area (with abundant water near by) in a shallow gully between the actual summit and a ridge to the north. It is on the main track which continues westward and shortly beyond the Padang falls

steeply towards the sea, and is about 100 yards beyond the point where the path leading to the actual summit of the Peak branches off to the left.

The building site which lies N.W. beyond the Padang and four or five minutes distant, consists of a long, slightly undulating ridge running east and west, gently rounded from side to side, in some places flat, and varying in width from one to two hundred yards. It is covered with grasses, etc., pitcher-plants and orchids and is dotted throughout with bushes, (*Boeckia*, *Leptospermum*, *Vaccinium*, *Rhododendron* and heaths), of a general height of 3-10 ft. but on several of the highest points of the ridge where the soil is deeper some of these become small trees growing in clumps with a height of 15-20 ft. and afford a welcome broken shade on a fine day. Golden-flowered *Xyris* and a pretty free-blossoming pink *Argostemma* give colour to the herbage, while everywhere the growth is so open that charming views can be obtained in many directions and if a certain amount of clearing were done the whole surrounding sea and land could be seen except in the section SE-SW.

Roughly, that portion of the horizon is obscured by the secondary summit of the mountain, seen from the site, a steep-sided ridge running parallel to the southward, thickly wooded and rising 500 ft. higher. Seaward this drops sharply for 100 ft. and then descends more gently to become a narrow *arrête* which rises again to a lower peak in the S.W. and screens the island of Penang from view. Landward this summit drops more gently, the path to the Peak running near its profile, while across its base the inland plains and distant hills can be seen.

The prospect eastwards is closed by the continuation of the ridge from which these views are recorded but to the northward can be seen the wide-spreading plain under rice cultivation stretching right away to the hills of Perlis and bordered by the sea. Through this can be traced the railway to Alor Star and the town itself can be picked up with beyond it, the most conspicuous of all features, the precipitous mass of Gunong Keriang. The islands of Terutau and Langkawi lie clear on the horizon and running south in a long curve is the sea-shore with the mouth of the Kedah River jutting out in the centre, Pulau Paya is in the middle distance and the wooded islets of the Bunting group with their glistening yellow beaches are strung out in a line nearer in; while only about four miles away lie the village and fruit-groves of Yen, the mouth of its stream being marked by a long grove of cocopalms. Sails, and even canoes at sea, can be seen quite clearly.

The open portion of the ridge, on which the soil is very shallow and peaty and where numerous outcrops of sand-stone and quartzite occur, is some 7-800 yards long and is only fit for building purposes: inland, however, where the forest grows, the soil is much deeper and richer and the surface being rounded

and even flat, a considerable area is provided which is suitable for vegetable gardens with little need for terracing. Through the woods of the ridge a path runs more or less northwards and having a gentle slope affords a pleasant walk.

In all about 20 acres would be available for building while about half that area could be cleared of forest for gardening and cow-keeping.

There appears to be an ample supply of water all the year round in the gully. Though a few mosquitoes occur at night no *Anopheles* were included in the collection made.

The higher ridge near the summit has also some extent of flattish land but this is much smaller than the area available at the lower site and there would be a difficulty about water: also a good deal of cloud or mist is generally present so that the slightly lower temperature ($\pm 2^{\circ}$) due to an extra height of 4-500 ft. would not counter-balance the greater area and convenience of the other locality.

Quite close to this is the actual summit which is reached in about 50 minutes from Padang 'toh Seh: from it there is a clear view in all directions, including Penang and its shipping, the Muda River and the Larut Hills.

II.—MAMMALS.

The mammal fauna of Kedah Peak appears to be very poor. This is due to the fact that the mountain has never had any connection with the main range of the Peninsula while uncongenial conditions have as usual prevented the upward spread of the lowland forms. By far the most interesting of the few animals obtained were *Hylomys suillus*, *Epimys ferreocanus* and *Chiropodomys gliroides*.

Besides the species recorded below there were observed a tiger, binturong and some small bats, but none of these were obtained. Fresh tracks of tapir were frequently met with just below the summit and the goat-antelope is reported to inhabit some of the peaks, while the cries of a species of gibbon and leaf monkey were heard from the lower slopes.

I. SCIURUS VITTATUS MINIATUS.

Sciurus notatus miniatus, Miller, Proc. Acad. Nat. Sci., Washington, II, p. 79 (1900).

3 Males.

Three very typical specimens in which the red pencil of the tail extends nearly half-way towards the base.

Not at all common on the higher slopes of the mountain.

2. SCIURUS TENUIS SURDUS.

Sciurus tenuis surdus, Miller, Proc. Acad. Nat. Sci., Washington, II, p. 80 (1900).

3 Males, 7 Females.

By far the commonest squirrel on the mountain and not differing in any way from lowland animals: in no way approaching our recently described *S. t. gunong* from the Bandon hills [Journ. F.M.S. Mus., V. p. 119 (1914).]

3. EPIMYS VOCIFERANS.

Mus vociferans, Miller, Proc. Biol. Soc., Washington, xiii. p. 198 (1900), pls iii and iv, fig. 3.

2 Females.

Only two examples of this generally common hill rat were trapped.

4. EPIMYS SURIFER.

Mus surifer, Miller, Proc. Biol. Soc., Washington, xiii, p. 148 (1900), pl. v, fig. 4, a, b, c.

2 Males, 2 Females.

Four examples of this, the commonest spiny rat in the Peninsula, were obtained: the pelage of all is somewhat pale and dull.

5. EPIMYS CREMORIVENTER.

Mus cremoriventer, Miller, Proc. Biol. Soc. Washington, xiii, p. 144 (1900), pl. v, fig. 2, a, b, c.

1 Male, 1 Female.

This little rat has always been found sparsely distributed in the mountains of the Peninsula and only two individuals were obtained on the present occasion.

6. EPIMYS ASPER.

Mus asper, Miller, Proc. Biol. Soc. Washington, xiii, p. 145 (1900), pl. v, fig. 3, a, b, c.

22 Males, 8 Females.

This species was extremely common. It was found, here as elsewhere, to vary considerably in brightness of coloration, the yellow tone of the upper surface ranging from bright ochraceous-tawny to pale clay. The grey under surface is sometimes suffused with ochraceous but this feature is in no way correlated with a brighter back.

7. EPIMYS JALORENSIS.

Mus jalorensis, Bonhote, Fasciculi Malayenses, Zoology, Pt. 1, p. 28 (1903), pl. ii, figs 1 and 2; pl. iv. fig. 4.

3 Males, 2 Females.

These are representatives of the common *rattus* of the Malay subregion and though we have used for it the name applied by Bonhote we doubt, when large series of Malayan and Bornean animals are compared, that it will be considered in any way distinct from the subspecies *neglectus* of that island.

7. CHIROPODOMYS GLIROIDES.

Mus gliroides, Blyth, Journ. Asiat. Soc. Bengal, xxiv, p. 721 (1855).

3 Males, 1 Female.

Of this charming little rodent four individuals were obtained which were taken in the hollow internodes of bamboos. It was represented in our Museum hitherto by five examples only and we had regarded it as a species of rare occurrence in our area, but this scarcity in collections is possibly rather due to reasons of habitat and habit.

9. TUPAIA GLIS WILKINSONI.

Tupaia ferruginea wilkinsoni, Robinson and Kloss, Journ. F.M.S. Mus, iv, p. 173 (1911).

1 Male, 1 Female.

These are rather dull coloured examples of this subspecies, the rump showing very little ferruginous tint; thus approaching, in its little-varied upper surface, the northern species *T. belangeri*.

10. HYLOMYS SUILLUS.

Hylomys suillus, Mull. and Schleg., Verhandelingen p. 153 (1839-44) pl. 25, figs. 4-7, pl. 26, fig. 1.

Though generally included as a member of our fauna this species seems to have been first definitely recorded from the Peninsula by Robinson whose collectors obtained an individual from the mountains of Selangor in 1910 [Journ. F.M.S. Mus. IV. p. 223 (1911)]. Several examples have since been captured in Perlis, the state north of Kedah, and now we have these two examples from Kedah Peak. We have compared them with animals from Sumatra (type region) and can discover no differences.

III. BIRDS.

We are aware of no paper dealing exclusively with the avifauna of the State of Kedah, nor indeed to our knowledge have any but very inconsiderable collections been made therein. A few species obtained by Cantor are mentioned by Moore in his "List of Malayan Birds collected by Theodore Cantor, M.D.," *P. Z. S.* 1854, pp. 258-285; 1859 pp. 443-468, while others obtained by the "Skeat Expedition" in 1899 are listed by *Bonhote, P. Z. S.* 1901 (i) pp. 57-81. To the east the avifauna of the Patani States is well known, that of Province Wellesley, Penang and Perak to the South and South-east has been thoroughly worked out, while to the north considerable collections have been obtained from the small boundary state of Perlis by the collectors of the Federated Malay States Museum, which disclose nothing of special interest.

To the north-east the fauna of Senggora is known from collections obtained by the "Skeat Expedition," which disclose no material difference between it and Patani and Jalor,

which was extensively worked by one of us. From the nature of the terrain it was not therefore probable that Kedah as a whole would disclose any form of special interest, but it was thought possible that Kedah Peak, rising as it does to a height of approximately 4,000 feet, might harbour some of the mountain species that are known from the main range mountains of the Federated Malay States to the south and from the mountains of Trang and Bandon to the North and North East. Moreover it was desirable to ascertain, whether the faunal boundary separating purely Malayan species from Tenasserimense races passed to the north or south of the peak.

With this object in view the mountain on its higher levels from the summit to about 2,500 feet was exhaustively searched from November 29th to December 11th, by three trained Dyak Collectors, well acquainted with the local fauna, and we do not think that they are likely to have missed any species really resident on the hill at the time.

As a result the hill was found to be extraordinarily barren in bird life, both species and individuals being very scarce, the only forms at all common being *Aethopyga temminckii*, *Turdinus magnirostris* and *Hemixus cinerea*.

The results conclusively show that Kedah Peak has never been connected either with the Trang mountains or those of the main range in such a manner as to permit the passage of the fauna of these two districts to it. The tradition in Malay Legend that until comparatively recent times the Peak was an island has probably therefore some foundation in geological fact.

Besides the specimens actually listed, three species of hornbills were seen and numerous individuals of a large *Spizaetus*, probably the black form of *Sp. limnaetus*, but these have no bearing on the general conclusions. No game birds were seen or heard nor did pigeons of any kind occur on the peak, though *Carpophaga badia* is usually found on mountains of this elevation. Round the summit *Hirundo javanica* and *H. gutturalis*, *Chaetura gigantea* and *Ch. leucopygialis* were noted, but no species of *Collocalia*.

The rarest and most interesting acquisition was *Prionochilus thoracicus*, of which but few specimens have ever been obtained in the Malay Peninsula, while *Anthus maculatus* and *Cichloselys sibericus* are rare seasonal visitors. The specimens obtained have been listed in detail but it has not been thought necessary to give any extensive references to the local literature. Occurrence to the north in Trang and Bandon have, however, usually been quoted.

RALLINA SUPERCILIARIS (Eyton).

Rallina superciliaris (Eyton); Sharpe, *Cat. Birds Brit. Mus.* xxiii, p. 76 (1894) Robinson & Kloss, *Ibis*, 1911, p. 10.

a. 1 Female imm. Kedah Peak, 3,000 ft. 30th November, 1915. No. 2,112. "Iris orange, bill dark slate, sea February, 1916.

green at base of lower mandible, feet Payne's grey." H.C.R. & C.B.K.

This bird is quite immature and has the head earthy brown, uniform with the mantle. From the relative lengths of the tarsi and toes it would appear to be referable to this species and not to *Limnobaenus paykulli*, from which it is somewhat difficult to distinguish young birds.

ACCIPITER AFFINIS, Gurney.

Accipiter affinis, Gurney; *Robinson, Ibis*, 1915, p. 728.

a. 1 Male imm. Kedah Peak, 3,950 ft. 2nd December, 1915. [No. 2,142.] "Iris lemon yellow, bill slate, black on culmen, greenish yellow on cere and gape, tarsi, greenish yellow, toes more yellow." [H.C.R. & C.B.K.]

This specimen, which is in immature plumage, agrees well with Kloss' specimens from S. E. Siam. Total length, 270; wing, 158, tail, 128, tarsus, 45 bill from gape, 18 mm.

Several of these little hawks frequented the cliffs at the summit of the peak and hunted the Spine-tailed and common swifts that were common there, though they never seemed to be successful.

SCOPS MALAYANA, Hay.

Scops malayana, Hay; *Sharpe, Cat. Birds Brit. Mus.* ii, p. 58 (1875); *Robinson & Kloss, Ibis*, 1911, p. 31.

a. 1 Female. Kedah Peak, 3,000 ft. 5th December, 1915. [No. 2,181.]

"Iris chrome, bill horn, darker at tip, yellowish beneath, feet dirty whitish, yellowish on soles." H.C.R. & C.B.K.

This owl, whose soft hoot was heard on two or three nights, appears to be commoner in the northern half of the Peninsula than in the south, where very few specimens have been obtained.

CYPSELUS PACIFICUS (Lath).

Cypselus pacificus (Lath.); *Robinson, Journ. Fed. Malay States Mus.* ii, p. 175, (1909).

a. 1 Male. Summit of Kedah Peak, 3,978 ft. 4th December, 1915. [No. 2,167.]

? Iris dark, bill black, feet pinkish black." [H.C.R. & C.B.K.]

In considerable numbers flying round and over the cliffs at the summit.

PYROTROGON ORESCIUS (Temm.).¹

Pyrotrogon orescius (Temm.); *Robinson & Kloss, Ibis*, 1911, p. 39; *Robinson, Journ. Fed. Malay States Mus.* v, p. 92 (1914).

a. b. 2 Females. Kedah Peak, 3,000 ft. 2—5th December 1915. [Nos. 2,141, 2,185.]

"Iris greyish-purple, bill and orbital skin smalt, culmen black, feet pale lead, soles pink." [H.C.R. & C.B.K.]

Not common on the hill. More abundant generally in the northern parts of the Peninsula than further south.

ZANCLOSTOMUS JAVANICUS (Horsf.).

Zanclostomus javanicus (Horsf.); *Shelley, Cat. Birds Brit. Mus.* xix, p. 370 (1891); *Robinson & Kloss, Ibis*, 1911, p. 42; *Robinson, Journ. Fed. Malay States Mus.* v, p. 94 (1914).

a.-d. 4 Males. Kedah Peak, 3,000 ft. 29th November—5th December, 1915. [Nos. 2,106, 2,168, 2,170, 2,172.]

"Iris claret, orbital skin smalt, bill coral, feet Payne's grey, soles dirty yellow." [H.C.R. & C.B.K.]

Very common, climbing about the trees in the laboured way peculiar to this group of Cuckoos. Widely spread throughout the Peninsula. ascending the hills to over 4,000 ft.

ALSEONAX LATIROSTRIS (Raffles).

Alseonax latirostris (Raffles); *Sharpe, Cat. Birds Brit. Mus.* iv, p. 127 (1879); *Robinson & Kloss, Ibis*, 1911, p. 51 Male.

a. 1 Female. Kedah Peak, 3,000 ft. 3rd December 1915. [No. 2,151.]

"Iris dark hazel, bill dark horn, basal half of lower mandible yellowish white, feet brownish grey." [H.C.R. & C.B.K.]

CYORNIS CONCRETA (S. Mull.).

Pachycephala cyanea (Hume); *Gadow, Cat. Birds Brit. Mus.* viii, p. 224 (1883).

Cyornis concreta (S. Mull.); *Hartert, Nov. Zool.* ix, p. 549 (1902); *Robinson, Journ. Fed. Malay States Mus.* v, p. 25 (1914).

a, b. 2 Males. Kedah Peak, 3,000 ft. 30th November—3rd December, 1915. [Nos. 2,108, 2,148.]

"Iris dark hazel, bill black, feet greyish black." [H.C.R. & C.B.K.]

Of late years this anomalous flycatcher has been found on most of the mountains of the Malay Peninsula from about 1,000 ft. to 3,500 ft. It is, however, nowhere common.

POLIOMYIAS LUTEOLA (Pall.).

Poliomyias luteola (Pall.); *Sharpe, Cat. Birds Brit. Mus.* iv, p. 201 (1879).

a. 1 Female. Kedah Peak, 3,000 ft. 6th December 1915. [No. 2,189.]

"Iris dark, bill corneous, feet greenish brown." [H.C.R. & C.B.K.]

A migrant, widely distributed throughout the Malay Peninsula, especially on the islands off the coast from September to May.

PHILENTOMA PYRRHOPTERUM (Temm.).

Philentoma pyrrhopterum (Temm.); *Sharpe, Cat. Birds Brit. Mus.* iv, p. 366 (1879); *Robinson & Kloss, Ibis*, 1911, p. 53; *Robinson, Journ. Fed. Malay States Mus.* v, p. 100 (1914).

a, b. 1 Male, 1 Female. Kedah Peak, 3,000 ft. 9th December 1915. [Nos. 2,219—20.]

"Male: iris red, bill black, feet lavender. Female: iris red, bill pale horn, whitish at gape, feet pale brown." [H.C.R. & C.B.K.]

Widely distributed all over the Peninsula, commoner in the more northern districts.

RHINOMYIAS PECTORALIS (Salvad.).

Rhinomyias pectoralis (Salvad.); *Sharpe, Cat. Birds Brit. Mus.* iv, p. 368 (1879); *Hartert, Nov. Zool.* ix, p. 553 (1902).

a—b. 1 Male, 1 Female. Kedah Peak, 3,000 ft. 2—5th December 1915. [Nos. 2,146, 2,184.]

"Iris hazel, bill black, feet livid purplish pink." [H.C.R. & C.B.K.]

Not very common anywhere but found at medium elevations throughout the Peninsula.

CHLOROPSIS ICTEROCEPHALA (Less.).

Chloropsis icterocephala (Less.); *Sharpe, Cat. Birds Brit. Mus.* vi, p. 30 (1881).

a—f. 4 Males, 2 Females. Kedah Peak, 3,000 ft. 3rd—8th December 1915. [Nos. 2,155, 2,175, 2,182, 2,197, 2,209—10.]

Male: iris rich hazel brown, bill black, feet greenish lead. Female: iris chestnut, bill slate, greenish slate on lower mandible, feet pale greenish plumbeous." [H.C.R. & C.B.K.]

Fairly common on the peak, which is nearly the northern limit of the species. The form occurring in Trang and Bandon is *C. chlorocephala*, while birds from Perlis immediately to the north of Kedah are intermediate.

HEMIXUS CINEREUS (Blyth).

Hemixus cinereus (Blyth); *Sharpe, Cat. Birds Brit. Mus.* vi, p. 52, pl. 11 (1881).

a—h. 8 Males. Kedah Peak, 3,000 ft. 29th November—7th December 1915. [Nos. 2,103—4, 2,138, 2,147, 2,165—6, 2,198, 2,201.]

"Iris red or chocolate, bill black, feet greyish brown, soles yellowish flesh. Common everywhere on the hill in parties of two or three.

Several of the specimens have the undertail coverts faintly washed with greenish, which is apparently an indication of immaturity.

HEMIXUS MALACCENSIS (Blyth).

Hemixus malaccensis (Blyth); *Sharpe, Cat. Birds Brit. Mus.* vi, p. 52 (1881); *Robinson and Kloss, Ibis*, 1911, p. 56; *Robinson, Journ. Fed. Malay. States Mus.* v, p. 102 (1914).

a-c. 1 Male, 2 Females. Kedah Peak, 3,000 ft. 30th November—9th December 1915. [Nos. 2,113, 2,132, 2,217.]

"Iris chocolate, orange, or ochraceous, bill dark greenish slate, brownish on lower mandible, feet pinkish brown." [H.C.R. & C.B.K.]

Widely spread in the Peninsula in the same situations as the preceding species but not so common or conspicuous a bird.

CRINIGER TEPHROGENYS (Jard. and Selby).

Criniger tephrogenys (Jard. and Selby); *Hartert. Nov. Zool.* ix, p. 558 (1902);

a-c. 2 Males, 1 Female. Kedah peak, 3,000 ft. 7-9th December 1915. [Nos. 2,200, 2,215-6.]

"Iris reddish brown, bill slate, black on culmen, feet yellowish pink." [H.C.R. & C.B.K.]

This is the yellowish low-country and southern form not *C. ochraceus*, Moore, which occurs further north and in the mountains of the southern part of the Peninsula above about 3,000 ft.

PYCNONOTUS SIMPLEX, Less.

Pycnonotus simplex, Lesson; *Sharpe, Cat. Birds Brit. Mus.* vi, p. 153 (1881).

a-c. 2 Males, 3 Females. Kedah Peak, 3,000 ft. 3-7th December 1915. [Nos. 2,149, 2,159-60, 2,194, 2,203.]

"Iris white, bill black or dark horn, feet pinkish brown." [H.C.R. & C.B.K.] Agreeing well with other specimens from the southern parts of the Peninsula in having the ear-coverts entirely unstreaked therein differing from the more northern form *P. robinsoni*, Ogilvie Grant. Wing 86-76 mm.

There is considerable doubt as to the proper name to be applied to this bulbul which can probably be divided into numerous local races. Pending a general investigation of the whole group we have adopted that generally used by English authors.

RUBIGULA CYANIVENTRIS (Blyth).

Rubigula cyaniventris (Blyth); *Sharpe, Cat. Birds Brit. Mus.* vi, p. 169 (1881); *Robinson, Journ. Fed. Malay States Mus.* ii, p. 196 (1909).

a. 1. Male. Kedah Peak, 3000 ft. November 30th 1915. [No. 2,120.]

"Iris dark blue, bill black, feet pale slate." [H.C.R. & C.B.K.]

The only one met with. Common all over the Peninsula up to 3,000 ft.

TURDINUS MAGNIROSTRIS (Moore).

Turdinus magnirostris (Moore); *Sharpe, Cat. Birds Brit. Mus.* vii, p. 547 (1883); *Robinson, Journ. Fed. Malay States Mus.* v, p. 103 (1914).

a—k. 7 Males, 4 Females. Kedah Peak, 3,000 ft. 30th November—6th December, 1915.

Nos. 2,109-10, 2,124-7, 2,130-1, 2,154, 2,158, 2,193.

"Iris carmine, brick-red or Indian red, bill slate, the culmen black, feet pale lavender." [H.C.R. & C.B.K.]

One of the commonest of submontane birds met with in small trees and low bushes in the undergrowth. It is one of the few Timeliine birds that is at all common on the islands off the Peninsular coast.

ANUROPSIS MALACCENSIS (Hartl.)

Anuropsis malaccensis (Hartl.); *Sharpe, Cat. Birds Brit. Mus.* vii, p. 588 (1883).

a—d. 2 Males, 2 Females. Kedah Peak, 3,000 ft. 29th November—2nd December, 1915. [Nos. 2,100, 2,107, 2,143-4.]

"Iris red or chestnut, bill slate, black on culmen, feet fleshy pink." [H.C.R. & C.B.K.]

A common scrub bird ranging in altitude to about 3,000 feet but not extending much further north than Trang.

CORYTHOCICHLA LEUCOSTICTA, Sharpe.

Corythocichla leucosticta, *Sharpe, P.Z.S.* 1887, p. 438; *Robinson & Kloss, Ibis*, 1911, p. 61; *Robinson, Journ. Fed. Malay States Mus.* v, p. 104 (1914).

a. 1 Male. Kedah Peak, 3,000 ft. 29th November, 1915. [No. 2,099.]

"Iris carmine, bill bluish horn, blackish at base, feet greyish brown." [H.C.R. & C.B.K.]

It was somewhat surprising to meet this short-tailed Babbler on Kedah Peak, where none of the other species with which it is usually associated occur. Of late years it has, however been met with in several other outlying situations notably on Gunong Tampin in Negri Sembilan and on Pulau Tioman off the coast of Pahang.

ALCIPPE CINEREA, Blyth.

Alcippe cinerea, Blyth: *Sharpe, Cat. Birds Brit. Mus.* vii, p. 622 (1883); *Robinson & Kloss, Ibis*, 1911, p. 61; *Robinson, Journ. Fed. Malay States Mus.* v, p. 105 (1914).

a—h. 6 Males, 2 Females. Kedah Peak, 3,000 ft. 1st-9th December, 1915. Nos. 2,128, 2,183, 2,191-2, 2,206-8, 2,218.

"Iris reddish hazel, bill dark horn, tomia and gape paler, feet pinkish slate." [H.C.R. & C.B.K.]

Common everywhere on the lower hills of the Peninsula as far North as Bandon, but more numerous in the South.

STACHYRHIS NIGRICEPS subsp. DAVISONI, Sharpe.

Stachyrhis davisoni, *Sharpe, Bull. Brit. Orn. Club*, i, p. vii, (1892); *Robinson & Kloss, Ibis*, 1911, p. 61; *Robinson, Journ. Fed. Malay States Mus.* v, p. 105 (1914).

Stachyrhis nigricep davisoni, *Harington, Journ. Nat. Hist. Soc. Bombay*, xxiii, p. 625 (1915).

a—c. 3 Females. Kedah Peak, 3,000 ft. 30th November—4th December, 1915. [Nos. 2,123, 2,161-2.]

"Iris pale hazel, chestnut or chocolate, bill slate, the culmen black, feet greyish brown with a greenish cast." [H.C.R. & C.B.K.]

On low trees and shrubs, fairly common. Apparently ranging from the extreme south of the Peninsula northwards to Karen-nee. The above specimens exactly agree with topotypes from the Tahan River with which they have been compared.

HERPORNIS ZANTHOLEUCA (Hodgs).

Herpornis zantholeuca (Hodgs): *Sharpe, Cat. Birds, Brit. Mus.* vii, p. 636 (1883); *Robinson & Kloss, Ibis*, 1911 p. 63; *Robinson, Journ. Fed. Malay States Mus.* v, p. 107 (1914).

a—i. 6 Males, 3 Females. Kedah Peak, 3,000 ft. 3rd-9th December, 1915. [Nos. 2,152, 2,157, 2,169, 2,173-4, 2,196, 2,199, 2,205, 2,221.]

"Iris dark brown or hazel, bill pinkish horn, feet yellowish pink. [H.C.R. & C.B.K.]

A very common and characteristic submontane bird, not found as a rule above 3,500 ft. or at low elevations near the coast.

CICHLOSELYS SIBERICUS (Pall).

Cichloselys sibericus (Pall); *Robinson, Journ. Fed. Malay States Mus.* ii, p. 206 (1909).

a—c. 3 Females. Kedah peak, 3,000 ft. 29th November—2nd December, 1915. [Nos. 2,098, 2,105, 2,140.]

"Iris dark hazel, bill black, yellowish green on base of lower mandible, yellow at the gape, tarsi and feet brownish yellow, more yellow posteriorly and on the soles." [H.C.R. & C.B.K.]

A migrant found during the winter months on several of the higher mountains of the Peninsula.

HYDROCICHLA RUFICAPILLA (Temm).

Hydrocichla ruficapilla (Temm); *Sharpe, Cat. Birds Brit. Mus.* vii, p. 319 (1885); *Robinson Journ. Fed. Malay States Mus.* ii, p. 207 (1909).

a. 1 Male. Kedah peak, 3,000 ft. 2nd December 1915. [No. 2,139.]

"Iris dark hazel, bill black, feet pale whitish pink." [H.C.R. & C.B.K.]

Not common. Elsewhere in the Peninsula it is abundant on mountain streams up to about 3,500 feet.

LARVIVORA CYANEA (Pall).

Larvivora cyanea (Pall); *Robinson, Journ. Fed. Malay States Mus.* ii, p. 207 (1909); *id. op. cit.* v, p. 149 (1914); *Robinson & Kloss, Ibis* 1911, p. 64.

a—b. 2 Females. Kedah Peak, 3,000 ft. 5th December 1915. [Nos. 2, 176, 2, 178.]

"Iris hazel, upper mandible horn, lower pinkish, tarsi and feet pale pinkish white." [H.C.R. & C.B.K.]

Common throughout the Peninsula in the winter months, though possibly some few individuals remain throughout the year as it has been obtained as late as May 16th.

ORTHOTOMUS ATRIGULARIS (Temm).

Orthotomus atrigularis (Temm); *Sharpe, Cat. Birds Brit. Mus.* vii, p. 220 (1883); *Robinson, Journ. Fed. Malay States Mus.* ii, p. 208 (1909).

a—b. 2 Males. Kedah Peak, 3,000 ft. 2-3rd December 1915. [Nos. 2, 145, 2, 156.]

"Iris brown or hazel red, bill pinkish horn, darker on culmen, feet brownish pink." [H.C.R. & C.B.K.]

Here reaching about its maximum elevation. Common about low bushes in the clearing.

PHYLLOSCOPUS BOREALIS subsp. BOREALIS (Blas).

Phylloscopus borealis borealis, *Hartert, Vog. Pal. Faun.* I. 1909, p. 517; *Robinson, Ibis*, 1915, p. 754.

a—h. 5 Males, 3 Females. Kedah Peak, 3,000 ft. 29th November—9th December, 1915. [Nos. 2,101-2, 2,150, 2,153, 2,180, 2,188, 2,204, 2,213.]

"Iris hazel, bill yellowish, upper mandible and tip brownish horn, feet brownish, yellowish posteriorly." [H.C.R. & C.B.K.]

A very common winter visitor to the Malay Peninsula. All these specimens are in worn and faded plumage and are difficult to make out. The wing measurement varies from about 63-67 mm. so they cannot be referred to the larger eastern race *P. b. zanthodryus*, Swinh.

MELANOCHLORA FLAVOCRISTATA (Lafr).

Melanochlora flavocristata (Lafr.); *Robinson and Kloss, Ibis*, 1911, p. 70; *Robinson, Journ. Fed. Malay States Mus.* v, p. 108 (1914).

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a—b. 2 Males. Kedah Peak, 3,000 ft. 5th December, 1915. [Nos. 2,177, 2,179.]

"Iris hazel, bill black, feet greenish slate." [H.C.R. & C.B.K.]

One flock only was met with; elsewhere the species is numerous, throughout the submontane tracts of the Peninsula.

MOTACILLA MELANOPE, Pall.

Motacilla melanope, Pall.; *Sharpe, Cat. Birds Brit. Mus.* x, p. 497 (1895); *Robinson and Kloss, Ibis*, 1911, p. 73.

a. 1 Female. Kedah Peak, 3,000 ft. 9th December 1915. [No. 2214.]

"Iris dark, bill bluish slate, darker on culmen, feet pale brownish." [H.C.R. & C.B.K.]

The only one seen, though this wagtail is usually common on forest paths up to a considerable altitude during the winter months.

ANTHUS MACULATUS, Hodgs.

Anthus maculatus, Hodgs.; *Sharpe, Cat. Birds Brit. Mus.* x, p. 547 (1885); *Robinson and Kloss, Ibis*, 1911, p. 478.

a. 1 Female. Kedah Peak, 3,000 ft. 30th November, 1915. [No. 2,117.]

"Iris dark, upper mandible horn, lower pink, feet whitish pink." [H.C.R. & C.B.K.]

A rare winter visitor to the Malay Peninsula, only two other records of its occurrence being to hand.

AETHOPYGA TEMMINCKI (S. Müll.)

Aethopyga temmincki (S. Müll.); *Gadow, Cat. Birds Brit. Mus.* ix, p. 16 (1884).

a—l. 10 Male ad., 1 Male imm., 1 Female. Kedah Peak, 3,000 ft. 29th November—9th December 1915. [Nos. 2,111-2, 2,111a., 2,114-5, 2,122, 2,129, 2,171, 2,186-7, 2,195, 2,211-2.]

"Iris dark, feet reddish brown, bill brownish horn" [H.C.R. & C.B.K.]

Exceedingly common in open spaces at 500 feet, and over, together with the Flowerpeckers.

This is a very characteristic submontane bird inhabiting the zone between about 500 ft. and 3,000 ft. In the coast lands it is replaced by *Ae. siparaja* and *Ae. s. cara* and on the higher mountains by *Ae. wrayi*, Sharpe.

The present species has a pleasant though feeble little song and is very active and restless in its movements. On Kedah Peak females were curiously scarce and hardly any were seen.

February, 1916.

DICAENUM TRIGONOSTIGMA (Scop.)

Dicaeum trigonostigma (Scop.); *Sharpe, Cat. Birds Brit. Mus.* x, p. 38 (1885).

a—f. 5 Males, 1 Female. Kedah Peak, 3,000 ft. 30th November—8th December 1915. [Nos. 2,118–9, 2,133–4, 2,137, 2,202.]

“Male: iris dark, bill greenish slate, paler at the base of the lower mandible, feet dark slaty green. Female: iris dark, bill pale orange, culmen and tip horn brown, feet dark green slate.” [H.C.R. & C.B.K.]

Common on flowering trees in open spaces near our camp.

Abundant everywhere in the Peninsula up to about 3,500 ft.

PRIONOCHILUS IGNICAPILLUS (Eyton).

Prionochilus ignicapillus (Eyton); *Sharpe, Cat. Birds Brit. Mus.* x, p. 65 (1885).

a—b. 2 Males. Kedah Peak, 3,000 ft. 4th December, 1915. Nos. 2163–4.

“Bill black, iris chestnut, feet slaty black, lower mandible slate except at tip.” [H.C.R. & C.B.K.]

Not very common on Kedah Peak. Sparsely distributed throughout the Peninsula, attaining about 3,000 ft. as its maximum elevation.

PRIONOCHILUS MACULATUS (Temm.).

Prionochilus maculatus (Temm.); *Sharpe, Cat. Birds Brit. Mus.* x, p. 69 (1885).

a. 1 Female. Kedah Peak, 3,000 ft. 6th December, 1915. [No. 2,190.]

b. 1 Male. Gurun, Kedah 50 ft. 13th December, 1915. [No. 2,252.]

“Iris chestnut, bill slate, the culmen black, feet dark greenish slate.” (H.C.R. & C.B.K.)

Not so common as others of the family but very generally distributed over the whole length of the Peninsula, from Bandon to Singapore.

PRIONOCHILUS THORACICUS (Temm.).

Prionochilus thoracicus, *Sharpe, Cat. Birds Brit. Mus.* x, p. 67 (1885); *Ogilvie Grant, Journ. Fed. Malay States Mus.* iii, p. 19 (1909); *Robinson, Journ. Straits Branch. Roy. Asiat. Soc.* No. 57, p. 14 (1911).

a—c. 3 Male. Kedah Peak, 3,000 ft. 30th November—1st December, 1915. [Nos. 2,121, 2,135–6.]

“Iris dark, bill black, feet greenish slate.” [H.C.R. & C.B.K.]

This bird was found singly feeding on the flowers of a small species of *Eugenia* growing in open tracts on the mountain. Though very common in Borneo it is one of the rarest of Peninsular birds and of late years has been met with on only two occasions, once on Gunong Tahan at 3,000 ft. and again at Temengoh, in Upper Perak, at low elevations.

IV. REPTILES and BATRACHIANS.

As with the other vertebrata these appeared to be very scarce on Kedah Peak and none were obtained of any special interest excepting perhaps *Mabnia novemcarinata* which has not often been met with in the southern half of the Peninsula.

The references are to Boulenger's recent volume on the Reptilia and Batrachia of the Malay Peninsula.

1. GYMNODACTYLUS PULCHELLUS (Gray).

Blgr. p. 36.

A young example of this beautiful gecko was obtained at 3,000 ft. Snout to vent 55 mm. Above brownish-yellow with four broad black bands on the trunk and another on the head running from the eyes round the nape, all narrowly edged with bright lemon-yellow. Rostrum and limbs brown; a narrow lemon-yellow band between, and in front of, the eyes; supra-orbital regions greenish. Tail white with nine broad black bands. Under surface deep fleshy-pink.

2. DRACO MELANOPOGON, Blgr.

Blgr. p. 62.

3 Males, 1 Female.

Evidently not uncommon on the Peak but the only flying-lizard met with.

3. APHIANOTIS FUSCA (Peters).

Blgr. p. 64.

A single specimen was obtained at 2,000 ft.

4. MABUIA NOVEMCARINATA (And).

Blgr. p. 82.

Two small examples of this lizard, rare in the Peninsula, were obtained at 3,000 ft.

Besides the foregoing scink a small lizard, probably *Lygosoma* sp. was frequently observed on the extreme summit where it lived among the grass and stones; it was, however, too rapid in movement to allow of capture.

5. TROPIDONOTUS TRIANGULIGERUS, Boie.

Blgr. p. 125.

One example from 3,000 ft. taken by the banks of a stream.

6. *COLUBER OXYCEPHALUS*, Boie.

One example from 3,000 ft. Its brilliant green colour and tail of orange black-edged scales render this a remarkably handsome snake.

7. *DENDROPHIS FORMOSUS*, Boie.

Blgr. p. 145.

One small individual from 3,000 ft.

8. *DRYOPHIS PRASINUS*, Boie.

Blgr. p. 175.

One example from 3,000 ft.

9. *LACHESIS WAGLERI* (Boie.)

Blgr. p. 218.

One specimen from 3,000 ft.

10. *RANA MACRODON*, Dum. and Bibr.

Blgr. p. 233.

An immature example of this frog was obtained at 3,000 ft, measuring 78 mm. from snout to vent.

11. *RHACOPHORUS LEUCOMYSTAX* (Gravenh).

Blgr. p. 249.

One specimen of this frog was obtained at 3,000 ft. It is the commonest of its genus in the Peninsula.

12. *BUFO ASPER*, Gravenh.

Blgr. p. 271.

Two full-grown examples from 3,000 ft.

13. *MEGALOPHRYS NASUTA* (Schleg.)

Blgr. p. 279.

A small example (snout to vent 55 mm.) was met with at 3,000 ft. Colour of body above yellowish-brown with a reddish-chocolate area covering the back, extending over the sides and forking on the nape to the eyelids.

APPENDIX.

During our stay at Alor Star previous to our ascent of Kedah Peak and at Gurun after our return, small collections were made. Few things therein were of any special interest, but a list of the species is here given for the sake of the locality.

I—MAMMALS.

1. *PRESBYTIS OBSCURA*.

Semnopithecus obscurus, Reid, P.Z.S., 1837, p. 14.

1 Female imm. Gurun, Kedah.

2. PTEROPUS VAMPIRUS MALACCENSIS.

Pteropus vampyrus malaccensis, K. Andersen, Ann. & Mag. Nat. Hist. (8) II, p. 363 (1902).

A single immature example of this fruit-bat was obtained at Gurun: it is a half-grown individual with a forearm of 175 mm. only.

3. CYNOPTERUS BRACHYOTIS.

Pachysoma brachyotis, S. Mull, Tyd. Nat. Gesch., V, pt. 1 p. 146 (1838).

2 Males, 15 Females. Gurun, Kedah.

A large number of smaller fruit bats were obtained at Gurun but those which were obviously immature were not preserved. As shown by the external measurements given below, they are undoubtedly examples of *C. b. brachyotis*.

| | | | | |
|------------------|-----|------|---|----------|
| Head and Body | ... | 89 | — | 95 |
| Ear from orifice | ... | 16 | — | 18. |
| Forearm | ... | 60 | — | 65.5 |
| 3rd Metacarpal | ... | 39 | — | 44.5 |
| Tibia | ... | 21.5 | — | 24.5 mm. |

4. TAPHOZOUS MELANOPOGON, subsp.

Taphozorus melanopogon, Temm. Mon. Mamm., II, p. 287, p. 60, figs. 8, 9 (1835—41).

14 Males, 13 Females. Gunong Kriang, Kedah.

Gunong Kriang, 700 ft. high, is an isolated and precipitous limestone mass standing in the flat Kedah plain some miles north of Alor Star. It is penetrated by deep tunnel-like caves and in its walls are many more of a shallower nature. These latter are inhabited by large numbers of bats of this species but no others were met with.

These examples resemble all other specimens of *melanopogon* from the Malay Peninsula and adjacent islands but appear to differ from the typical race in having paler fur and wing-membranes which are almost white.

5. SCIURUS CONCOLOR.

Sciurus concolor, Blyth, Journ. Asiat. Soc. Bengal, XXIV, p. 474 (1855).

1 Female.

A very typical example, showing no approach to *Sc. milleri*, Robinson and Wroughton [Journ. F. M. S. Mus. IV, p. 233 (1911)] from Trang, a state to the north of Kedah.

6. SCIURUS VITTATUS MINIATUS, Miller.

1 Male, 2 Females.

7. EPIMYS SURIFER (Miller).

2 Males, 1 Female.

Of similar dull colour to specimens from the Peak.

8. EPIMYS ASPER (Miller.)

2 Females.

9. EPIMYS FERREOCANUS (Miller.)

Mus. ferreocanus, Miller, Proc. Biol. Soc. Washington, XIII, p. 140 (1900), pls. III and IV, figs 2, a.

2 Females.

This rare Malayan rat has hitherto been taken only on the mountains at altitudes of 3,000 ft. or so. It was therefore a surprise to find that it occurred in the plains at the foot of Kedah Peak, while it was not met with on that mountain itself.

10. GALEOPTERUS PENINSULAE, Thomas.

Galeopterus peninsulae, Thomas, Ann. and Mag. Nat. Hist. (8) 11, p. 303 (1908).

1 Male.

11. TUPAIA GLIS WILKINSONI, Robinson and Kloss.

2 Females.

Typical specimens with ferruginous rumps and thus rather brighter than the examples from the Peak.

12. TRAGULUS KANCHIL RAVUS.

Tragulus rarus, Miller, Proc. Biol. Soc. Washington, XV, p. 173 (1902).

1 Male.

The lesser Malayan mouse-deer (pelandoc), appeared to be very common at Gurun, as during our stay of a couple of days a number were brought to us by the inhabitants who, however, said they were unable to trap the napu or larger mouse-deer.

In the examples of the pelandoc which we examined the nape-stripe was a clear black, sharply margined and contrasted with the colour of the sides of the neck, and cannot quite be matched by numerous other examples from all parts of the Peninsula.

2. BIRDS.

PELARGOPSIS MALACCENSIS, Sharpe.

a. 1 Female. Gurun Kedah 50 ft. 12th December, 1915. [No. 2,237.]

"Iris dark brown, bill maroon, tip black, tarsi and orbits coral, claws dark." [H.C.R. & C.B.K.]

Precisely agreeing with southern specimens and showing no approach to the northern form, *P. g. burmanica*, Sharpe.

HALCYON PILEATA (Bodd.).

a. 1 Male. Gurun Kedah, 50ft. 14th December, 1915.
[No. 2,256.]

SURNICULUS LUGUBRIS (Horsf.)

a. 1 Male. Gurun, Kedah, 50 ft. 13th December, 1915.
[No. 2,254.]

"Iris dark brown, bill, feet brownish black." [H.C.R. & C.B.K.]

HIEROCOCCYX NANUS, Hume.

Hierococcyx nanus, Hume; *Shelley, Cat. Birds Brit. Mus.* xxx, p. 238 (1892); Robinson & Kloss, *Journ. Fed. Malay States Mus.* v, p. 172 (1915).

a. 1 Male. Gurun, Kedah, 50 ft. December 11th, 1915.
[No. 2,224.]

"Iris very dark brown, bill greenish slate, base of upper mandible black, orbital skin and gape pale chrome, feet yellow, claws pale wax yellow. [H.C.R. & C.B.K.]

This specimen agrees well with two others in the Museums, one from the Krau River, Pahang, collected on 31st October, 1913 and another from Ginting Bidei, Selangor-Pahang border, 2,300 ft., obtained on September 30th 1914.

Measurements of the above bird taken in the flesh. Total length 281; wing 150; tail, 158; tarsus, 20; bill from gape, 30 mm.

Wing of the Krau River Bird, 146 mm. Of the Ginting Bidei one, 147 mm.

This species is extremely rare in the Malay Peninsula proper and the above three specimens are the only ones from our area of which we have any record, with the exception of the birds from Salanga or Junk Zeylon, recorded by Muller (*Journ. fur. Orn.* 1882, p. 405). It is probably commoner in Tenasserim.

RHOPODYTES DIARDI (Less.)

a. 1 Male. Gurun, Kedah, 50 ft. 13th December, 1915.
[No. 2,241.]

"Iris pale blue, orbital skin crimson lake, feet dark greenish slate, bill sea green, area of nostrils bluish." [H.C.R. & C.B.K.]

CHOTORHEA VERSICOLOR (Raffles).

a—b. 2 Females. Gurun, Kedah, 50 ft. 12th December, 1915. [Nos. 2,227, 2,233.]

"Iris chestnut, bill black, slaty at base, feet greenish lead." [H.C.R. & C.B.K.]

CHRY SOPHLEGMA MALACCENSE (Lath.).

a. 1 Male. Gurun, Kedah, 50 ft. 13th December, 1915. [No. 2,242.]

"Iris chestnut, upper mandible black, lower slate, feet plumbeous green." [H.C.R. & C.B.K.]

CYMBORHYNCHUS MACRORHYNCHUS (Gm.)

Cymborhynchus macrorhynchus (Gm.) Robinson, *Ibis*, 1915, p. 740.

a—b. 1 Male, 1 Female. Gurun, Kedah, 50 ft. 11–12th December, 1915. [Nos. 2,223, 2,238.]

"Iris emerald, bill robin's egg blue, lower mandible chrome yellow, except gape and tomia, tarsi smalt grey.

Of these two specimens one has a marked white patch on the inner web of the three outer pairs of tail feathers and the other on the outermost pair only. One just received from Paku Saribas, Southern Sarawak, Borneo has no white whatever on the tail.

PITTA CYANOPTERA, Temm.

a. 1 Female. Gurun, Kedah, 50 ft. 12th December, 1915. [No. 2,232.]

"Iris hazel, bill black, pinkish yellow at gape, feet fleshy pink." [H.C.R. & C.B.K.]

HYPOTHYMIS AZUREA subsp. PROPHATA, Oberholser.

a. 1 Female. Gurun, Kedah, 50 ft. 13th December, 1915. [No. 2,251.]

"Iris dark, bill black, feet slaty black." [H.C.R. & C.B.K.]

TERPSIPHONE PARADISI subsp. AFFINIS, Blyth.

a. 1 Female imm. Gurun, Kedah, 50 ft. 12th December 1915. No. 2,229.

"Iris dull green; eye, wattle, and tarsi, smalt; bill pale lead.

Being in quite immature plumage the identification of this specimen is somewhat doubtful; it may possibly be *T. p. incii*, Gould.

PHILENTOMA VELATUM (Temm.)

a—b. 1 Male, 1 Female. Gurun, Kedah, 50 ft. 13th December, 1915. [Nos. 2,250, 2,253.]

"Iris carmine, bill and feet black." [H.C.R. & C.B.K.]

ARTAMIDES SUMATRENSIS (S. Müll).

a. 1 Male. Gurun, Kedah, 50 ft. 13th December, 1915. [No. 2,240.]

"Iris yellowish white, bill black, feet powdery black." [H.C.R. & C.B.K.]

Always a rather rare bird, but widely distributed throughout the Malay Peninsula.

CHLOROPSIS CYANOPOGON (Temm).

a—c. 2 Males, 1 Female. Gurun, Kedah, 50 ft. 14th December, 1915. [No. 2,257-9.]

EUPTILOSUS EUPTILOSUS (Jard. and Selby).

a. 1 Male. Gurun, Kedah, 50 ft. 13th December, 1915. [No. 2,248.]

"Iris red, bill black, feet slaty black." [H.C.R. & C.B.K.]

MICROTARSUS MELANOCEPHALUS (Gm).

a. 1 Female. Gurun, Kedah, 50 ft. 12th December, 1915. [No. 2,228.]

"Iris turquoise, bill black, feet dark olive brown." [H.C.R. & C.B.K.]

TRICHOLESTES CRINIGER (Blyth).

a. 1 Male. Gurun, Kedah, 50 ft. 13th December 1915. [No. 2,249.]

"Iris greyish white, bill bluish horn, feet yellowish flesh." [H.C.R. & C.B.K.]

PELLORNEUM SUBOCHRACEUM, Swinh.

a. 1 Male. Gurun, Kedah, 50 ft. 13th December, 1915. [No. 2,247.]

"Iris hazel, orbital skin greenish yellow, bill pale horn, base of lower mandible and gape yellow, feet yellowish flesh." [H.C.R. & C.B.K.]

ERYTHROCICHLA BICOLOR (Less).

a—b. 2 Males. Gurun, Kedah, 50 ft. 13th December, 1915. [Nos. 2,243-4.]

"Iris pale hazel, bill horn, blackish on culmen, feet fleshy." [H.C.R. & C.B.K.]

DRYMOCATAPHUS NIGROCAPITATUS (Eyton).

a. 1 Male. Gurun, Kedah, 50 ft. 12th December, 1915. [No. 2,234.]

"Iris red, upper mandible black, lower greenish white, feet pale brown." [H.C.R. & C.B.K.]

SETARIA AFFINIS (Blyth).

a. 1 Female. Gurun, Kedah, 50 ft. 12th December, 1915. [No. 2,230.]

"Iris hazel, bill slate, lower mandible greenish slate, feet pale slate." [H.C.R. & C.B.K.]

ANUROPSIS MALACCENSIS, Hartl.

a. 1 Female. Gurun, Kedah, 50 ft. 11th December, 1915. [No. 2,222.]

STACHYRIS NIGRICOLLIS (Temm).

a. 1 Male. Gurun, Kedah, 50 ft. 13th December, 1915. [No. 2,246.]

"Iris red, bill black, base slate, feet black." [H.C.R. & C.B.K.]

MACRONUS PTILOSUS, Jard. and Selby.

a. 1 Male. Gurun, Kedah, 50 ft. 13th December, 1915. [No. 2,245.]

"Iris red, orbital skin smalt, bill black, feet greenish black." [H.C.R. & C.B.K.]

PLATYSMURUS LEUCOPTERUS (Temm).

a—b. 2 Males. Gurun, Kedah, 50 ft. 12th December, 1915. [Nos. 2,226, 2,231.]

"Iris carmine, bill and feet black." [H.C.R. & C.B.K.]

DICRURUS ANNECTENS, Hodgs.

a—c. 3 Females imm. Gurun, Kedah, 50 ft. 12–13th December, 1915. [Nos. 2,225, 2,236, 2,255.]

"Iris red, or reddish brown, bill and feet black." [H.C.R. & C.B.K.]

DICRURUS NIGRESCENS, Oates.

Dicrurus nigrescens, Oates, *Faun. Brit. Ind. Birds*, i, p. 315 (1889).

a—e. 2 Male, 3 Female. Near Alor Star, Kedah. 25th November, 1915. Nos. 2,260–4.

"Iris red, bill and feet black." [H.C.R. & C.B.K.]

This locality is the most southerly recorded for the Tenasserim Ashy Drongo. The species is new to the Federated Malay States Museums.

EULABES JAVANENSIS (Osbeck).

a. 1 Male. Gurun, Kedah, 50 ft. 12th December, 1915. [No. 2,139.]

"Iris hazel, bill orange, tip and lappets chrome, legs chrome, claws, dark horn." [H.C.R. & C.B.K.]

LEPTOCOMA HASSELTII (Temm).

a. 1 Male. Gurun, Kedah, 50 ft. 12th December, 1915. [No. 2,235.]

"Iris dark, bill and feet black." [H.C.R. & C.B.K.]

REPTILES & BATRACHIANS.

1. GONYOCEPHALUS GRANDIS (Gray).

Blgr. p. 66.

A half-grown example was obtained at Gurun.

2. CALOTES CRISTATELLUS (Kuhl.).

Blgr. p. 70.

One example of the green "chameleon," so common in the more southern parts of the Peninsula, was obtained at Gurun, where it was apparently largely replaced by the following species.

3. CALOTES VERSICOLOR (Daud).

Blgr. p. 71.

Very numerous in the scrub vegetation about Gurun, and very sluggish, being easily taken by hand while seated on the branches and twigs of bushes, though it attempted to bite vigorously when caught.

4. MABUIA MULTIFASCIATA (Kuhl.).

Blgr. p. 84.

1 juv.

5. OXYGLOSSUS LAEVIS, Gunth.

Blgr. p. 225.

A small specimen of this frog was obtained at Gurun. It does not appear to have been met with often in the Peninsula.

Snout to vent 18 mm.

6. RANA MACRODON, Dum and Bibr.

One example from Gurun measuring 110 mm. from snout to vent.

7. RANA LIMNOCHARIS, Wieg.

Blgr. p. 236.

Numerous specimens were obtained at Gurun, the largest measuring 55 mm. from snout to vent; with two exceptions all possess a yellow vertebral stripe varying from 4 mm. to a hair's breadth.

8. RHACOPHORUS LEUCOMYSTAX, Gravenh.

2 examples from Gurun.

9. BUFO ASPER, Gravenh.

A small example of a toad from Gurun, measuring 27 mm. from snout to vent, appears to be the young of this species: there are, however, no bony ridges on the head nor in any tympanum distinguishable.

10. *BUFO MELANOSTICUS*, Schneid.

Blgr. p. 273.

A medium-sized individual from Gurun, with abnormal coloration, being blackish-brown above with this colour extending over and covering much of the undersurface in the form of patches and spots.

11. *BUFO PARVUS*, Blgr.

Blgr. p. 274.

One example from Gurun, snout to vent 28 mm. There are a number of distinct dark patches and irregular stripes on the upper surface, sides and limbs.

XVI. NOTES ON THE *HYPOMELANUS* FRUIT-
BATS OF THE STRAITS OF MALACCA, WITH THE
DESCRIPTION OF A NEW RACE *PTEROPUS*
HYPOMELANUS FRETENSIS.

By C. BODEN KLOSS, F.Z.S.

During the course of a cruise in the Straits of Malacca in April, 1915, the small islands of Paya and Jarak were visited and from each examples of the *hypomelanus* species of Flying-fox were obtained. This species has been represented hitherto along the west side of the Malay Peninsula by *P. h. geminorum* from the Mergui Archipelago and by *P. h. robinsoni* from the Sembilan Islands, about 10 miles from land, off the mouth of the Perak River.

P. h. geminorum, Miller, has until now been known only from the type locality, South Twin Island, in the Mergui Archipelago, so that its occurrence on Pulau Paya, about 350 miles to the south, considerably extends its range which, when more of the small intermediate islands have been examined, will doubtless be found continuous between the two.

Pulau Paya is roughly 7 miles west of the mouth of Kedah River and about the same distance south-east of the Langkawi group. It is a wooded island about a mile in length and half in breadth standing just within the 15 fathom line of soundings. Three examples of *P. h. geminorum*, which has now to be added to the faunal list of the Malay Peninsula, were obtained upon it, a male and two females, having the following external appearance:—

Backs: blackish-brown freely sprinkled with silvery hairs, producing a markedly grizzled effect.

Heads: like backs, the palest-backed specimen (female) having the greyest head; that of the male tinged with brown.

Mantles: male; hazel, narrowly edged posteriorly with bay; females, 1, bay, and 2, blackish-bay.

Underparts; throats blackish (except in the pale-backed female where it is grey like the head), chests seal-brown, rest of the lower surface strongly grizzled aniline black.

(For measurements see table p. 248.)

P. h. robinsoni, K. And., was described from three specimens collected on Pulau Rumpia: as we have now obtained others from that island, and also two more examples from Pulau Lallang, another of the Sembilan group, it is possible to give further particulars about this race.

Males, 4 examples:—

Backs: all specimens; brownish-black, sprinkled with silvery whitish hairs.

10/15. Mantle; ochraceous-tawny, becoming bay at the edges.

Head; black, rather more frosted than the back.

Underparts: brownish-black to black, scanty grizzled with pale hair tips.

9/15. Mantle; russet with darker edges.

Head; Mars-brown tinged with black.

Underparts; cheeks and throat blackish, chest bay, abdomen from ochraceous-tawny in centre to black on sides.

84/15. Mantle: warm blackish-brown, chestnut posteriorly.

Head; dark Mars-brown.

Underparts; as 9/15 but darker throughout.

85/15. Mantle; ochraceous-orange washed with chestnut on nape and shoulders.

Head and Underparts as 9/15.

Females 4 examples:—

Backs; light seal-brown sprinkled with a few whitish hairs (one individual, 8/15, is much paler than the others approaching in colour examples of *P. h. lepidus*, Miller, from the east side of the Peninsula).

248/09. Mantle, Sanford's brown, paler on posterior edge.

Three other females:—Mantles as above but much paler throughout.

Heads; pale Mars-brown, but this colour extending only to the cheeks and just beyond the eyes, crown like the posterior part of mantle or paler.

Underparts; centres of abdomen pale ochraceous-tawny, becoming seal-brown on throat and sides; no black.

An immature male resembles the females.

(For measurements see table p. 248).

While visiting Pulau Jarak seven specimens of a *hypomelanus* bat were collected. This little islet, which lies towards the middle of the Straits of Malacca about 30 miles west of the Sembilan Islands, is about 500 ft. high, in greater diameter about half a mile and is covered with forest. As is the case of Pulau Paya and the Sembilans the only other mammal met with on it was a form of *Epimys rattus*.

A series of seven bats was obtained, having the following characters:—

1 Male:—

Back; like *P. h. robinsoni*.

Mantle; burnt-sienna paling posteriorly, but becoming dark bay where it meets the back.

Head; dark Mars-brown to nape.

Underparts; Mars-brown, becoming blackish on throat and sides of body.

6 Females:—

Backs; as in females of *P. h. robinsoni*.

Mantle; bay to chestnut, much darker than *P. h. robinsoni* (one example, 83/15, however closely resembling 248/09 of that race).

Heads; resembling the male (except in 83/15, where the crown and mantle are concolorous, but differing from 248/09 in which the crown is pale).

Underparts; dark like the male or with the centre of the abdomen paler (the underpart of 83/15 however almost concolorous with the mantle).

(For measurements see table p. 248).

Amongst the above animals certain sexual differences of colour seem to be observable.

In *P. h. geminorum*, the series is too small for deductions and the male is only distinguished by a paler, brighter mantle as is usual among the Fruit-bats.

In animals from the Sembilans and Jarak the back of the males are uniformly darker, being blacker (less brown) and in the Sembilan examples the heads and mantles are also darker: an immature male alone resembling the females. In the Jarak series the mantle of the single male is, on the contrary, brighter and lighter than that of the female: so that the only constant difference between the sexes of animals from those two places is in the colour of the back.

The males from the three localities much more nearly resemble each other than do the females, in whom characters seem more stable. *P. h. geminorum*, with its grey head and back, is very unlike the others, and, since their darker head, mantle and underparts clearly distinguish Jarak females from females of *P. h. robinsoni*, I propose that the former should be known as

PTEROPUS HYPOMELANUS FRETENSIS, subsp. nov.

Characterised as follows: Back, light seal-brown, sprinkled with a few whitish hairs; mantle dark bay, head dark Mars-brown to nape; underparts bright Mars-brown, becoming blackish on throat and side.

Type. Adult female (skin and skull) F.M.S. No. 80/15. Collected on Pulau Jarak, Straits of Malacca, on April 5th, 1915.

(For measurements see table p. 248).

There are no characters in the skulls and teeth which will serve to distinguish between these races and, as may be seen from the table, measurements completely intergrade.

| | <i>P. h. geminatum</i> , Pulau Pava. | | <i>P. h. robinsoni</i> , Sembilan Ids. | | <i>P. h. frentensis</i> , Pulau Jarak | |
|---|---|-----------------|---|----------------|--|-----------------|
| | Male 24/15 | Female 23/15 | Male 9/15 | Female 8/15 | Male 77/15 | Female 79/15 |
| Skull, total length to gnathion ... | 65.6 | 64 | 65.7 | 64.7 | 67.8 | 63.3 |
| " palation to incisive foramina ... | 33.8 | 32.2 | 32.4 | 32 | 33 | 32.1 |
| " front of orbit to tip of nasals ... | 22.6 | 22.1 | 20.8 | 21.8 | 22.7 | 20.3 |
| " width of brain case at zygomatic ... | 23 | 22.4 | 23.6 | 22.5 | 23 | 20.5 |
| " zygomatic width ... | 36 | 33 | 38.3 | 34.4 | 37.2 | 31.7 |
| " width across m ¹ externally ... | 16.8 | 16.8 | 18.4 | 17.6 | 17.4 | 17 |
| " lachrymal width ... | 14 | 13 | 14 | 13.7 | 14.5 | 13.4 |
| " width across canines externally ... | 12.2 | 11.1 | 12.8 | 11.7 | 12.2 | 11.7 |
| " postorbital constriction ... | 7 | 6.9 | 7.6 | 7.1 | 7.2 | 7.2 |
| " interorbital constriction ... | 9.6 | 8.8 | 9.7 | 9 | 9.3 | 8.1 |
| " width of mesopterygoid fossa ... | 7.2 | 7.5 | 8.4 | 7.2 | 7.7 | 7.3 |
| " width between p ⁴ -p ⁴ internally ... | 10.6 | 10.1 | 11.2 | 10.5 | 11.2 | 10 |
| " between angula of canines ... | 7.2 | 6.4 | 7.9 | 7 | 7.9 | 6.9 |
| " orbital diameter ... | 12.4 | 13.1 | 13.6 | 13 | 13.1 | 12.6 |
| Mandible, length ... | 52.3 | 50 | 51.8 | 49.2 | 53.3 | 49.2 |
| " coronoid height ... | 25 | 23.8 | 25 | 24 | 26 | 24 |
| Upper teeth, c-m ² ... | 25.8 | 24 | 24.9 | 24.6 | 24.8 | 23 |
| Lower teeth, c-m ³ ... | 29.5 | 27.3 | 28.3 | 27.7 | 29 | 23 |
| Head and Body* | 236 | 222 | 229 | 214 | 220 | 205 |
| Forearm* | 127 | ... | 138 | 130 | 138 | ... |
| Ear* | 22 | 23 | 25 | 24 | ... | 28 |

* Native collectors' measurements.

XVII. ON TWO RODENTS NEW TO THE FAUNA
OF THE MALAY PENINSULA, WITH THE
DESCRIPTION OF A NEW SUB-SPECIES,
PITHECHEIRUS MELANURUS PARVUS

By C. BODEN KLOSS, F.Z.S.

In August 1915 I spent a fortnight on Bukit Kutu, Selangor, 3,485 ft., for the purpose of collecting insects. A few vertebrates were also obtained and preserved and amongst them were two mammals which have not hitherto been recorded from the Malay Peninsula: one being a species of small flying squirrel known hitherto from Billiton Island only and the other a form of the "red bush rat" only known until now from Java and Sumatra.

PITHECHEIRUS.

This genus has hitherto been represented by a single species, *Pithecheirus melanurus* Cuv., occurring in Java and, it is supposed, in Sumatra also, though no critical comparison between the animals of these two islands has been made.

It is a genus remarkable among the rodents of the Malayan sub-region for its long soft pelage which extends for some distance along the base of the tail, the remainder of that organ being practically hairless; and for the peculiar molar teeth. A full account, with illustrations, of *P. melanurus* is given by Dr. Jentink in "Notes from the Leyden Museum," Vol. xii (1890), p. 222; pl. 9, figs 1-4, and vol. xiv (1892), p. 122; pl. 3/4, figs 5-8.

In colour the Selangor animal apparently differs from Javanese specimens which are "chestnut tinged with red"; for the whole of the upper pelage, long, dense and very soft, is tawny throughout, but less rich in tone on the sides of the head and body and on the limbs. This colour occupies the tips of the hairs only, the whole of the bases and median portions being slate-coloured. There are a great many longer hairs which project beyond the denser fur but they are of the same colour and equally as soft as the latter.

The undersurface is clear white throughout with the exception of the fur on the base of the tail which is similar to that of the upper parts; and the chin, sides of the abdomen and lower parts of the hind-legs which are suffused with warm buff.

The ears are whitish at the base with pale brown tips and are clad with short tawny hairs on both sides. The feet are

white. The tail, which has 12 rings to the centimetre at its middle, is dark brown throughout and practically naked save for about 18 millimetres at the base, the hairs on the remainder being invisible except through a glass.

The skull, though smaller, is of the same general form as that of *P. melanurus* with the same extremely large, dilated, kidney-shaped bullae but otherwise differs in the following respects:—almost complete absence of parietal ridges with entire lack of a marked angular projection at their commencement; interparietal broader; interpterygoid space parallel-sided, not lyrate or horse-shoe shaped.

The teeth are apparently similar: of the upper molars the first has three longitudinal rows of triple cusps; the middle molar has two central, three internal and a single external cusp in contact with the first of the former (in both these teeth the median longitudinal cusps are largest); and the somewhat complicated posterior tooth has a single cusp at the anterior outer angle, two on the curved inner side and one posteriorly.

Of the lower molars the first has a small anterior cusp followed by three transverse rows of two cusps, those of the first row being as small as the front one; the middle tooth is of *Epimys* type with two transverse rows of two cusps; situated mesially at the posterior edge of both these teeth is another and much smaller cusp; the last molar has two small cusps anteriorly followed by a broad transverse ridge.

There is a marked difference in size between the teeth of Javan and Malay animals, and as the dimensions of the molars are not prone to increase with age it is apparent that the latter is a considerably smaller animal.

Though the Selangor specimen has the basi-occipital suture still open and the teeth scarcely showing signs of wear, the cranium, while globose, is somewhat rugose and I think the individual is sufficiently mature to illustrate the characters of the Peninsular animal: therefore in view of the difference of colour, size and skull characters I feel justified in separating Malayan animals from those of Java under the name of

PITHECHEIRUS MELANURUS PARVUS, subsp. nov.,
with characters as above.

Dimensions:—collectors' external measurements:—head and body, 122 (209)*; tail, 140 (186); hindfoot without claws, 26 (with claws, 30); ear, 15 (15). Skull: greatest length, 34.7 (41); condylo-basilar length, 30; palatilar length, 15.7; diastema, 8.7 (11); upper molar row, 7.3 (9); length of palatal foramina, 6; greatest length of bulla, 8.8; median nasal length 7.5; zygomatic breadth, 17.4 (22).

* Measurements in parentheses those of a Javanese example of *P. melanurus*, (Jentink *op. cit. supra*, p. 227).

Type:—Sub-adult male (skin and skull), F.M.S. Mus. No. 479/15. Collected on Bukit Kutu, Selangor, 3,400 ft., on 22nd August, 1915, by C. Boden Kloss.

PETINOMYS VORDERMANNI.

Sciuropterus vordermanni, Jentinck, Notes Leyden Museum, xii, p. 150, pl. vii, figs 13 and 14 (1890); Willink, *Natuurkundig, Tijdschrift Nederlandsch-Indië*, LXV, p. 233; Lyon, *Proc. U. S. National Museum* xxxi, p. 593 (1906).

P. vordermanni, which was described from a single specimen obtained from Billiton Island by Dr. A. Vordermann belongs to a genus characterised by a fairly short rostrum and very large, but low and flattened, bullae.

The following is the description of the type specimen, an adult male in (spirit):—

“Hairs of back black, each hair with a terminal chestnut band; sides of parachute bordered with pure white; under surface of body and of parachute pure white, cheeks and sides of neck with a brownish orange tinge. Hairs of tail of a fine chestnut, lighter towards the base of the tail. Generally the hairs are very soft and rather long.

The tail is partially distichous, namely, only its under side is distichous. All the hairs of the tail from its root to its tip are exactly of the same length.

No cheekbristles, nor bristles at the base of ears. Whiskers black.”

Young animals of the *Sciuropterus* group are generally blacker and duller above than adults and the Selangor example differs from the type in having the hairs of the upper surface tipped with ochraceous-tawny rather than chestnut, while the pelage adjacent to the edges of the membranes is clear black for 3 or 4 millimetres and in the same areas on the underside the base of the hairs are blackish with the terminal portions buffy white. The hairs of the tail are, again, vinaceous buff at the base, where they are a little shorter than on the distal portion, rapidly darkening to clove-brown: the tip is rounded; as in the type the tail is almost bushy above. In other respects the colour of the two animals appears to be similar.

The immaturity of the specimen is shown by the teeth, of which pm^3 and the last molar, though up, are not extruded but the unduly long ear and short nasals possibly indicate that when better material is available we may be able to distinguish a Malay Peninsula form. The nasals somewhat resemble those of *P. setosus*, as figured by Jentinck (*loc. cit.*, figs 5-6), but in all other respects the skull eminently resembles his illustration of *P. vordermanni*.

That the dimensions of the three examples may be compared with each other they are all given here.

| | | Billiton. | | Selangor. |
|---------------------------|-----|----------------------|--------------------|-------------|
| | | Male adult, type. | Female adult. | Female imm. |
| Head and body | ... | 100 | 103 | 96 |
| Tail | ... | 110 | 100 | 96 |
| Hindfoot | ... | 21 | 22 (with claws) | 23 |
| Ear | ... | 12.5 | 12 | 16 |
| Skull: greatest length | | 27 | 29 | 28.8 |
| Condyllo-basilar length | ... | ... | ... | 24.3 |
| Diastema | ... | 5.5 | 5.6 | 5.6 |
| Upper molar row | ... | 5.5 | 5.5 | 5.5 |
| Medium length of nasals | ... | ... | 8.0 | 6.2 |
| Greatest breadth of skull | | 17.0 | 17.3 | 16.8 |

XVIII. NOTES ON SOME ROCK-SPECIMENS FROM THE AROA ISLANDS.

(Plates XXXV—XXXVIII).

By J. B. SCRIVENOR, *Geologist, F.M.S.*

[In August and November, 1906, the Aroa Islands were visited by Mr. H. C. Robinson and an account of the group and of the collections obtained on Pulau Jemor, the largest islet, was published by him in the *Journal Federated Malay States Museums* II, pp. 8-16 (1906).

A request having been made to the Museums Department for information as to the geology of the Aroas a third visit was paid to them in February, 1915, to collect rock specimens and to obtain a series of the native rat (*E. rattus* subsp.,) of which animal insufficient examples had been secured on the former visits.

It is unnecessary to repeat the description of the islands already given: here it may be added, however, that they are situated near the northern extremity of a 10 fathom area projecting from the Sumatran Coast in long. $100^{\circ} 33'$ E. and Lat. $2^{\circ} 53'$ N. where they form a compact little group with a number of isolated rocks and islets occurring in the sector N.E.—S.E. of it, at distances varying from $3\frac{1}{2}$ to 7 miles. The main group is fringed by numbers of jagged rocky reefs, many of which are exposed at low spring tides (Pl. XXXV., fig. 1).

Contrasted with the numerous forested islets of this region the Aroas are somewhat remarkable on account of their lack of vegetation, a scarcity which is most pronounced on Pulau Jemor, the north-easternmost and largest of the central islands. On account of their open nature charming views are obtained from the summits of most of them and the exposed reddish earth and rocks add richness to the colour of the scene. Amongst the shrubs in flower in February was the pretty pale pink myrtle, *Cynomyrtus tomentosa*.

The rat is the only terrestrial mammal and no bats were seen. No birds besides the common sea or shore species (and the few others which always occur in such situations) except a pitta (*P. cyanoptera*) and rail (*A. phaenicura*) were observed, the collection made being practically similar to that secured on the former visit in August, thus showing that the migration season which was at its height in November 1906 had come to an end. A day-flying mosquito was both numerous and active.

Weathering appears to have taken place most strongly on Jemor, where vegetation is scantiest. The rocks seem to be tilted at a high angle, about 70 or 80 degrees, and to dip from

S. W. to N. E. The sandstone is of varying stages of hardness and at the summit of the island is soft and crumbly (pl. XXXVI., fig. 2). Where it has weathered it is cut down to about sea-level and what were once larger islands now consist of a group of several smaller ones connected by a sandy gully or standing on a common reef awash at low tides. There appears to be no coral in the vicinity. *C. Boden Kloss.*]

SEDIMENTARY ROCKS FROM PULAU JEMOR,
OR LONG AROA.

Specimens of sandstone and shale from Pulau Jemor were sent to me in February, 1915 by Mr. H. C. Robinson. They are grey shale, light coloured sandstone, and a slightly coarser sandstone, partly stained red, and containing small white angular fragments which suggest kaolinized felspar, but which are in reality derived from a weathered rock containing micro-organisms.

The shale contains minute flakes of mica and resembles the grey shales found in several localities of the Peninsula. The specimens do not show any organisms.

Thin sections mounted for examination with the microscope are necessary to see the micro-organisms in the white angular fragments of the sandstone. As the sections are not very translucent, bright illumination is necessary, and then only a few fragments show the organisms clearly. They are all radiolaria, sometimes showing the reticulation of the test plainly but never sufficiently well preserved for specific determination.

Fragments and pebbles of a similar radiolarian rock are common in the coarse quartzites of the Peninsula, where they have been almost certainly derived from certain radiolarian cherts found *in situ*. The quartzites, as far as is known at present, are all Mesozoic, fossils having been found in Perak, Pahang and Singapore, and the fragments in the Aroa rocks suggest that they may be an extension of the Peninsula rocks. If opportunity offers, the grey shales should be searched for *Estheriella*, a small fossil difficult to detect, that occurs in Perak and points to brackish or fresh water conditions during the Trias, when the shales were laid down.

Mr. Robinson describes the rocks on Pulau Jemor as highly inclined. One of the photographs (Pl. XXXVI, fig. 1) shows this.

XIX. ADDITIONS TO RIDLEY'S "LIST OF THE FERNS OF THE MALAY PENINSULA."

By C. G. MATTHEW, *Fleet-Surgeon*.

Mr. Ridley's List of the Ferns of the Malay Peninsula was published in 1908 on pp. 1-50 of the fiftieth part of the Journal of the Straits Branch of the Royal Asiatic Society. To it the following are addenda, arranged with references to the pages of the List:—

- p. 7. *Gleichenia flagillaris*, Spr. Singapore, Johore (Matthew).
8. *Alsophila Ridleyi*, Baker. Penang Hill (Matthew).
9. *A. Kingii*, C.B. Clarke. Perak: Gunong Inas, 5,600 ft. (R. H. Yapp); Gunong Hijau, 4,500 ft. (Matthew).
A. dubia. Bedd. Gunong Inas (R. H. Yapp).
10. *Dicksonia (Dennstoedtia) scandens*, Bl. Perak: 4,600 ft. (Hose); Gunong Hijau, 4,000 ft. (Matthew); Gunong Bubu, 5,400 ft. (Herb. Kew).
12. *Trichomanes Mottleyi*, van den Bosch. Perak: Kunas River (Matthew).
13. *T. pyxidiferum*, Linn. Singapore (Matthew).
14. *T. Penangianum*, Christ., sp. nov. Penang Hill, (Matthew).
17. *Davallia Lorrainei*, Haner. Penang (Herb. Kew).
23. *Pteris pellucida*, Presl. Perak: Gunong Hijau (Matthew). Penang: Richmond Pool (Matthew).
Pt. inaequalis, Baker. Perak: Maxwell's Hill, 2,500 ft. (Matthew).
24. *Pt. asperula*, J. Sm. Perak: Gunong Pondok (Matthew).
Pt. longipes, Don. Perak: Maxwell's Hill, 3,000 ft. (Matthew).
27. *Asplenium Mactieri*, Bedd. = *A. Wightianum*, Wall., with simple fronds.
A. subavenium, Hook. Maxwell's Hill (Matthew).
28. *A. hirtum*, Kaulf. Maxwell's Hill (Matthew).
29. *Diplazium porphyrorachis*, Baker. Perak (Herb. Kew).
30. *D. ziphophyllum*, Baker. Perak (Hose).
D. japonicum, Christ. Perak: Maxwell's Hill (Matthew).
31. *Anisogonium heterophlebium*, Mett. Pahang: Telom River. (Ridley).

- p. 35. *Lastrea sparsa*, Don. Perak; Maxwell's Hill, (Matthew).
36. *Nephrodium extensum*, Bl. Singapore (Matthew).
37. *N. glandulosum*, Hook. Singapore (Matthew).
N. procurrens, Baker. Singapore: Bukit Timah (Matthew).
38. *N. abortivum*, J. Sm. Singapore: Bukit Timah (Matthew).
39. *Nephrolepis ramosa*, Moore. Selangor: Batu Caves (Matthew).
41. *Polypodium callophyllum*, C. H. Wright, sp. nov. Perak: Gunong Hijau (Matthew).
P. lomarioides, Bl. Singapore: Bukit Timah, on high Shores. This is the fern referred to in Ridley's List p. 10 as *Lecanopteris*, Bl.
42. *P. barathrophyllum*, Baker. Perak (Hose).
46. *Pleopeltis Sarawakensis*, Baker. Perak: Maxwell's Hill (Matthew). Probably the "*Pl. superficialis*, Bl."
47. *Pl. pteropus*, Bl. Selangor: Batu Caves (Matthew).
49. *Syngamme quinata*, Hook. Perak: Maxwell's Hill (Matthew).
Selliguea Hamiltoniana, Hook. Malay Peninsula (Scortechini).
51. *Antrophyllum chinaceum* (Wall.). Perak (King's collector, No 565)
A. plantagineum var. *angustifolium* (Brack). Malay Peninsula: Gunong Sonoy (M. de Moigan).
Vittaria Sikkimensis, Kuhn. Penang Hill (Ridley). Perak: Maxwell's Hill (Matthew).
V. Ridleyi Christ., in lit. Province Wellesley: Bukit Panchur (Ridley). Very near *V. elongata*.
55. *Phytinopteris rigida*, Wall. Perak: Maxwell's Hill (Matthew).
58. *Isoetes polystachyum*, Wall. Perak: Gunong Pondok (Matthew).
59. *Alsophila glabra*, Hook. Perak: Gunong Hijau, 4,500 ft. (Matthew).



H C Robinson, Photo.

SENOI OF SINGKAI, PERAK.



H C Robinson Photo

SENOI OF SUNGKAI, PFRAK



H C Robinson Phot

SENOI OF SUNKAL, PERAK



C. B. Kloss, Photo

UP-RIVER SENOI OF SUNKAI, PERAK.



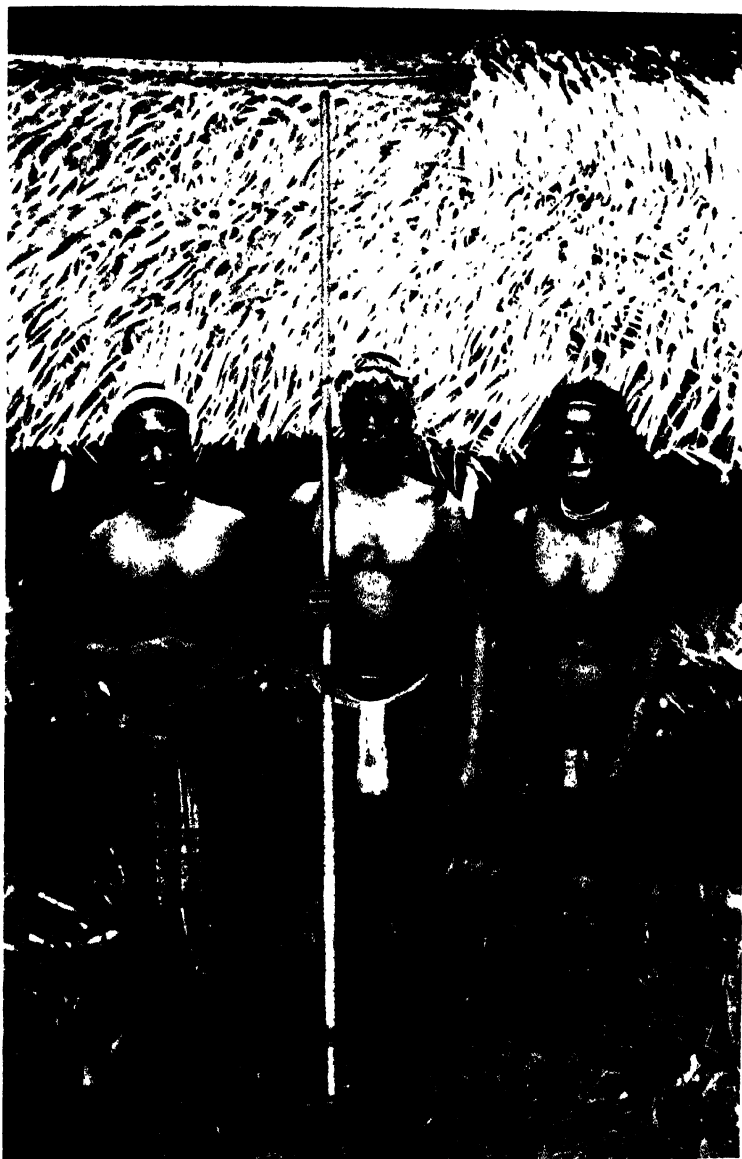
C. B. Kloss, Photo.

SENOI OF ULU SINGKAI, PERAK.



C. B. Klass, Photo

SENOI OF JERAM KAWAN, SUNGKAI RIVER, PERAK.



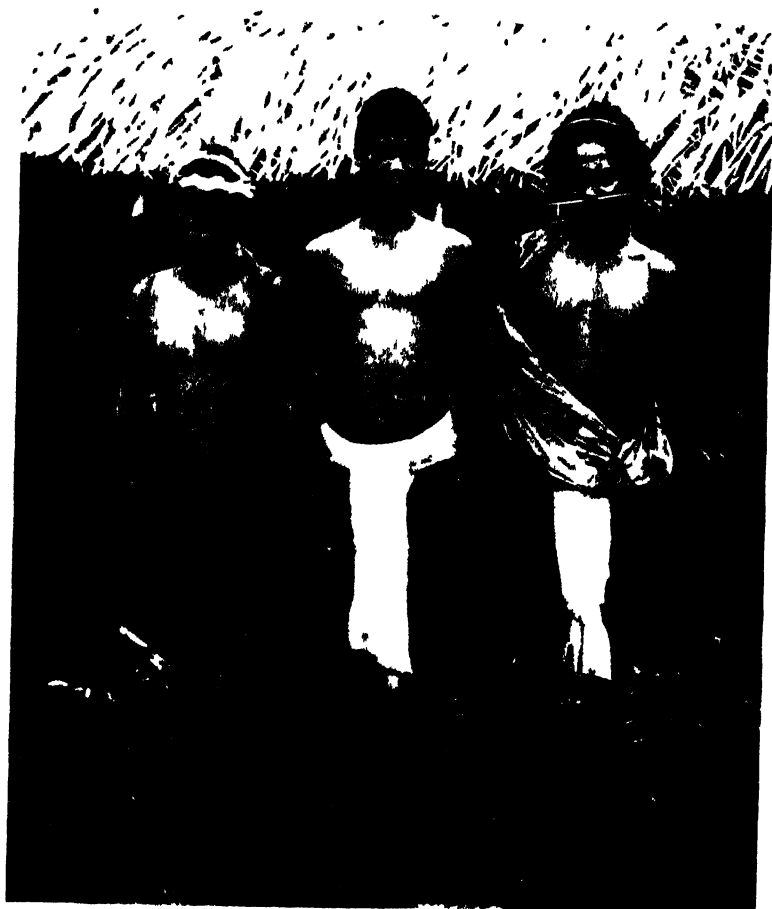
C. B. Kloss, Photo.

SENOI OF JERAM KAWAN, SUNGKAI RIVER, PERAK.



C. B. Kloss, Photo.

SENOI OF JERAM KAWAN, SUNGKAI RIVER, PERAK.



C. B. Kloss photo

SENOI OF JERAM KAWAN, SUNGKAI RIVER, PERAK



C. B. Kloss, Photo.

SENOI OF JERAM KAWAN, SUNGKAI RIVER, PERAK.



(B. Kloss, Photo)

SENOI OF JERAM KAWAN, SUNGKAI RIVER, PERAK



C. B. Kloss, Photo.

SENOI OF JERAM KAWAN, SUNGKAI RIVER, PERAK.



C. B. Kloss, Photo.

SENOI OF SLIM, PERAK.



C. B. Kloss, Photo.

SENOI OF SLIM, PERAK.



HOUSE OF SENOI SAKAI NEAR SUNGKAI, PERAK

C. B. Kloss, Ph. 13



SENOI OF SUNGEI MUDA. ULU SLIM, PERAK.

C. B. Kloss Photo



C B K'ss Photo

SENOI OF SUNGEI MUDA, ULU SLIM PERAK



C. B. Kloss, Photo.

SENOI OF SUNGEI MUDA, ULU SLIM, PERAK.



SENOI OF SUNGEI MUDA, ULU SLIM, PERAK.

C. B. Kloss, Photo.



SENOI WOMEN OF SUNGEI MUDA, ULU SLIM, PERAK

C. B. Kloss, Photo.



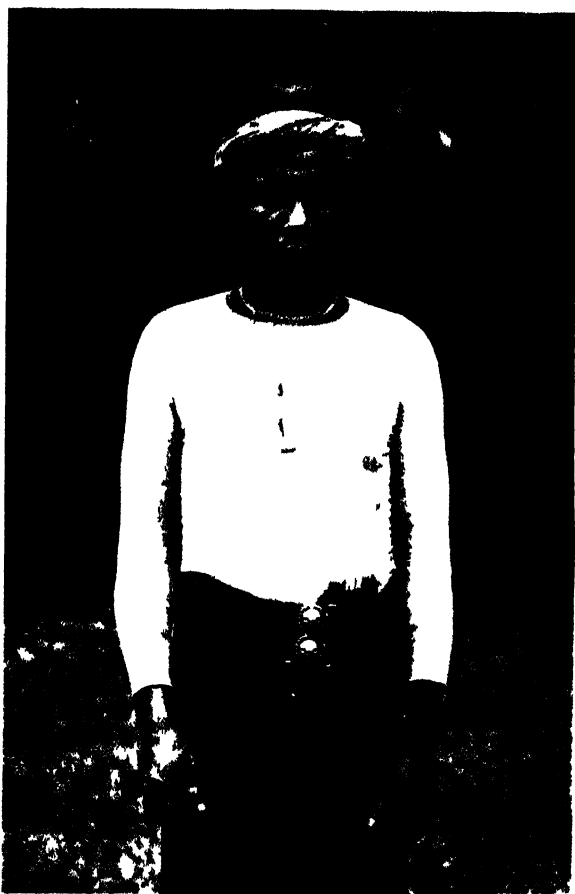
C. B. Kloss, Photo.

SENOI WOMEN OF SUNGEI MUDA, ULU SLIM, PERAK.



C. B. Klass, Photo.

SENOI OF SUNGEI MUDA, ULU SLIM, PERAK.



C B Kloss, Photo

SENOI OF SUNGEI KŌL, ULU SLIM, PERAK.

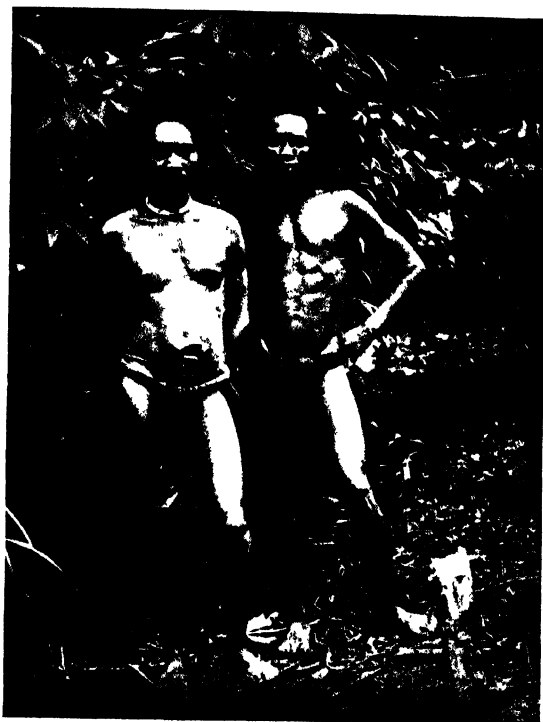


SAKAI OF JFRAM KAWAN, SUNKAI RIVER, PERAK



Photos, I H N Evans

SAKAI VILLAGE OF UNGKUN, SUNKAI RIVER, PERAK.



Photo, I. H. N. Evans.

SAKAI OF ULU SINGKAI, PERAK.



SAKAI OF ULU SUNGKAI, PERAK.

Photo, L. H. A. P. P. P.

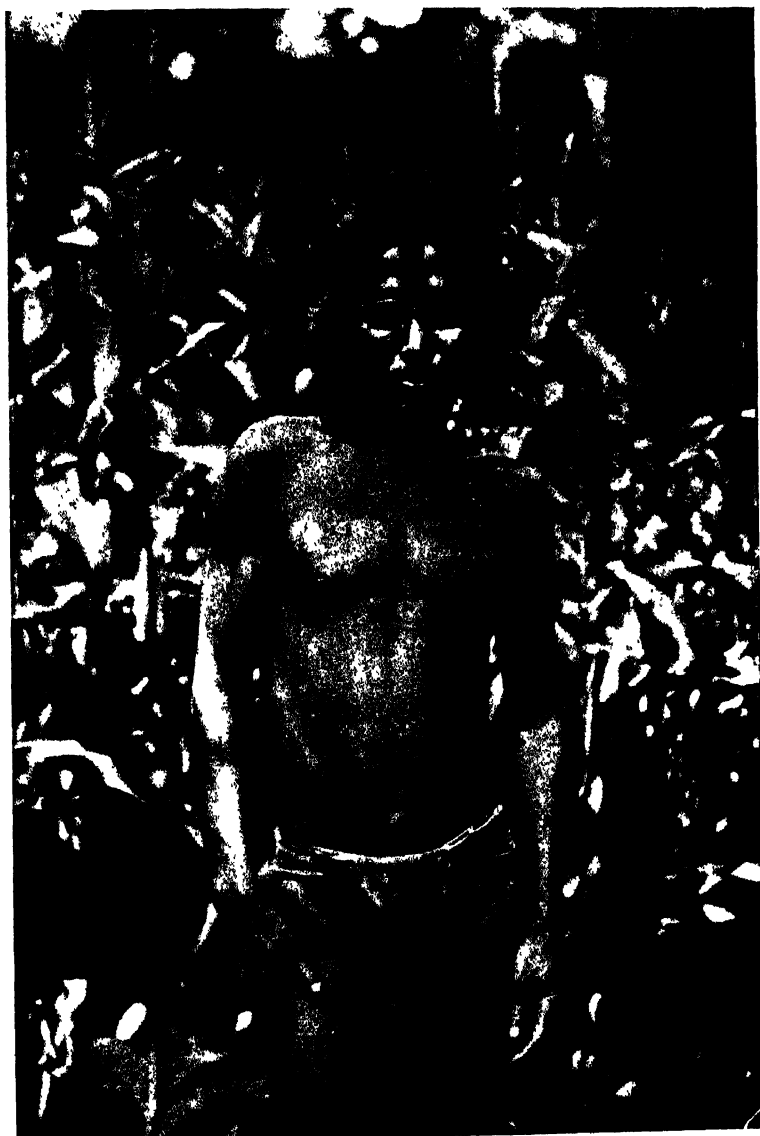
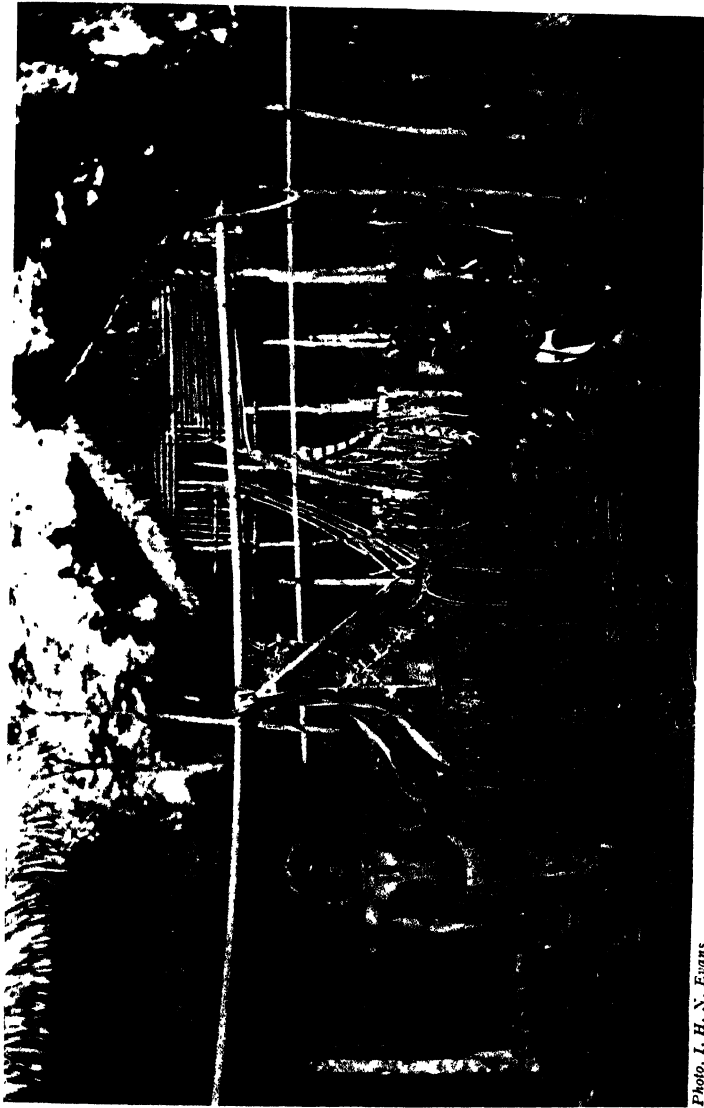


Photo T. H. N. Evans

SAKAI OF ULU SINGKAI, PERAK.



Photo, I. H. N. Evans.

HALAK'S PERFORMANCE AT UNGKUN, SUNKAI RIVER, PERAK.



Photo, I. H. N. Evans.

JAKUN OF PERTANG, NEGRI SEMBILAN.



JAKUN OF SERTING, NEGRI SEMBILAN.



Photos, I. H. N. Evans.

JAKUN OF JOHOL, NEGRI SEMBILAN.



J. H. N. Lucas, Photo.

FIG. 1

SEMANG OF GRIK, UPPER PERAK.



J. H. N. Evans, Photo.

FIG. 2

JEHEHR OF TEMENGOH WITH BOW AND BLOWPIPE.



FIG. 1

I. H. N. Evans, Photo
JEHEHR OF TENENGOH, UPPER PERAK.



FIG. 2.

I. H. N. Evans, Photo.
HILL SAKAI OF KUALA JINAHENG, UPPER PERAK.



J. H. N. Evans, Photo.

FIG. 1

COMMUNAL HOUSE OF HILL SAKAI, TIMENGOH-LASAH BRIDLE-PATH, UPPER PERAK.



J. H. N. Evans, Photo.

FIG. 2.

HILL SAKAI WITH BOW.



HILL SAKAI OF KUALA JINAHENG, UPPER PERAK.

I. H. N. Evans, Photos



C. B. Kloss, Photo

FIG. 1

LOW WATER AT WEST BAY, PULAU JEMOR, AROA ISLANDS,
STRAITS OF MALACCA.



C. B. Kloss, Photo.

FIG. 2.

LOW LAND ACROSS THE MIDDLE OF PULAU JEMOR.



C. B. Kloss, Photo.

FIG. 1.

SOUTH-EAST COAST OF PULAU JEMOR, AROA ISLANDS.



C. B. Kloss, Photo.

FIG. 2.

SUMMIT OF THE SOUTH-WEST EXTREMITY OF PULAU JEMOR.



C. B. Kloss, Photo.

FIG. 1.

PULAU JEMOR FROM THE WESTERN GROUP, AROA ISLANDS.



C. B. Kloss, Photo.

FIG. 2.

WESTERN GROUP, AROA ISLANDS, FROM PULAU JEMOR.



C. B. Kloss, Photo.

FIG. 1

BAY IN THE MAIN ISLAND, WESTERN GROUP, AROA ISLANDS.



C. B. Kloss, Photo.

FIG. 2.

SOME SMALLER ISLANDS OF THE WESTERN GROUP, AROA ISLANDS

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1. LIST OF *MICROCHIROPTERA*, OTHER THAN
LEAF-NOSE BATS, IN THE COLLECTION OF
THE FEDERATED MALAY STATES MUSEUMS.

By OLDFIELD THOMAS, F.R.S.

I owe to the kindness of Mr. H. C. Robinson the opportunity of examining certain of the bats preserved in the collection of the F.M.S. Museums, and at his suggestion I have written the following list. It contains the Microchiroptera other than the Leaf-nose bats, with which latter Dr. Andersen is dealing. By the generosity of the authorities of the F.M.S. Museums the British Museum has been permitted to retain a number of the specimens here enumerated, including the types of the three new forms described.

***Eptesicus dimissus*, sp. nov.**

Eptesicus pachyotis, Robinson & Kloss, Journ. Fed. Malay States Mus. V. p. 116 (1914).

Type. ♀ in al. Kao Nawng, Bandon, Malay Peninsula 3,500'. June 1913. F.M.S. Mus. No. 529/13. Collected by H. C. Robinson and E. Seimund.

A medium-sized species related to *E. pachyotis*. Size rather greater than in *E. pachyotis*. Body proportionally rather larger compared with the wings. Fur short (hairs of back about 3 mm. in length), rather sparse, mostly confined to the body except on the interfemoral, on a triangle at the base of the tail. Colour chestnut brown above, lighter below, the hairs of the mesial area of the undersurface broadly tipped with dull whitish or buffy. Ears short, rather narrow, inner base with a rounded basal lobe; inner edge slightly convex, tip rounded off, outer edge straight above, convex lower down, with a low antitragal lobe. Tragus short, its inner margin, which is scarcely longer than its breadth, slightly concave, tip rounded, outer margin convex with a fleshy basal lobe. Wings to the middle of the metatarsals. A distinct post-calcaneal lobule.

Skull broad and stoutly built, with a well marked occipital "helmet." Upper incisors with less disparity in size than in the allied species, the tip of the outer attaining three fourths the height of the inner, the latter rather small but still of the characteristic *Eptesicus* shape, parallel sided, bicuspid terminally; the outer tricuspid, obliquely concave. Last lower molar with its posterior portion nearly equal to the anterior part in area, and similar to it, as in most of the smaller species of the genus.

Dimensions of the type, measured on the spirit specimen.

Forearm, 42 mm.

Head and body, 57; tail, 39; ear, 14; tragus, length on inner edge 3, width 2-3. Third finger (epiphyses not fully ossified), metacarpus 39; first phalanx, 15; lower leg and hind foot with claw, 25.5 mm.

Skull, greatest length, 17.4; condyle to front of canine 15.8; basi-sinual length, 12.4; palato-sinual length, 6.3; front of canine to back of m^3 , 6.2 mm.

Habitat and Type, as above.

This bat has been determined as *E. pachyotis*, Dobs. of Assam, to which it is no doubt closely allied. But it may be distinguished by its larger size (the type being barely adult), the attachment of the wing membrane to the middle of the metatarsus instead of to the base of the toes, and by its proportionally much larger outer upper incisor.

Nyctalus stenopterus, Dobs.

Nyctalus stenopterus, Thomas & Wroughton, Journ. F.M.S. Mus. IV. p. 110 (1909).

♀ in al. Krian Road, Larut, Perak.

7 „ Singapore.

Pipistrellus tenuis, Temm. (?)

Kirivoula tenuis, Cantor Journ. Asiat. Soc. Bengal XV, p. 185, 1846.

♀ Telok Bahang, Penang.

All the pigmy pipistrels of this region are very rare in collections, and it is impossible at present to make out their relations to each other, or even to identify with certainty the original *P. tenuis*.

Glischropus tylopus, Dobs.

Vesperugo tylopus, Bonhote, P. Z S., 1900, p. 876.

♂ Krian Road, Larut, Perak.

Hesperoptenus blanfordi, Dobs.

Hesperoptenus blanfordi, Robinson & Kloss, Journ. F.M.S. Mus. V. p. 116 (1914).

Vesperugo blanfordi, Anderson Cat. Mamm. Ind. Mus., I, p. 133 (1881).

2 skins. Semangko Pass, Selangor—Pahang Boundary. 2,700 ft.

♂ in al. Gunong Tampin, Negri Sembilan. (Malacca boundary).

♂ in al. Telok Bahang, Penang.

♀ „ Kuala Lumpur, Selangor.

♂ „ Kao Nawng, Bandon, Peninsular Siam.

A rare bat, not hitherto received at the British Museum. These specimens quite agree with Dobson's description of the type from Tenasserim. A rather strongly marked naked pad or wart just under the *symphysis menti* is not mentioned by the describer, but is present in all the specimens.

Scotophilus castaneus, Horsf.

Scotophilus temminckii, Cantor, Journ. Asiat. Soc. Bengal, xv, p. 185 (1846).

Nyctecius kuhlii, Flower, P. Z. S. 1900, p. 346.

Scotophilus castaneus, Bonhote, P. Z. S. 1900, p. 142; id. Fasciculi Malayensis, Zool. Pt. I, p. 17 (1903); Thomas and Wroughton, Journ. F. M. S. Mus. IV, p. 110 (1900).

4 sk. and 5 in al. Telok Bahang, Penang.

1 " 1 " Lenggong, Perak.

1 " Kuala Lumpur, Selangor.

2 " 2 " Changi, Singapore.

6 " Tanjong Surat, Johore.

Myotis peytoni federatus, subsp. nov.

Type. ♀ skin. Semangko Pass, Selangor—Pahang Boundary. 2,700 ft., 25 Feb. 1908. S. M. 938/11. Original number 617.

Similar in general characters to typical *M. peytoni*, Wrought. & Ryley,* of Kanara, but the forearm, metacarpals and hind legs shorter.

Colour uniform dark brown, darker than in true *peytoni*, the tips of the hairs with scarcely any of the lighter wash evident in every specimen of *peytoni*.

Dimensions of the type, the italicized measurements taken in the flesh:—

Forearm 39.5 (45 in *peytoni*).

Head and body, 53; tail, 35; ear, 15. Third finger, metacarpus 36 (42 in *peytoni*) first phalanx 15.7 (16). Lower leg and hindfoot with claw 23.3 (28).

Skull, greatest length 16.5; basi-sinual length 12.6; front of canine to back of *m*³ 6.5.

Habitat and Type, as above.

This fine *Myotis* is so essentially similar to the S. Indian *M. peytoni*, the skulls being practically indistinguishable, that I only consider it as representing a local subspecies, in spite of the marked difference in the length of the limb-bones. Curiously enough, while the metacarpus is so much shorter than in true *peytoni*, the first phalanx of the third finger is of about the same length in the new forms.

* Journ. Bombay Nat. Soc. XXII, p. 13 (1913).

Myotis muricola, Hodgs.

Myotis muricola, Miller, Proc. Acad. Nat. Sci. Philadelphia, 1898, p. 321; Bophote, P. Z. S. 1900, p. 876; id. Fasciculi Malayensis, Zool. Pt. I, p. 18 (1903); Robinson and Kloss, Journ. F. M. S. Mus. V, p. 116 (1914).

Vespertilio muricola, Flower, P. Z. S. 1900, p. 347.

2 in al. Kuala Lumpur, Selangor.

♂ Kao Nawng, Bandon.

♀ Batu Caves, Selangor.

Leuconoe hasselti, Temm.

Myotis adversus? Thomas and Wroughton, Journ. F. M. S. Mus. IV, p. 110 (1909).

2 ♀ Lekop, Karimon Id. Rhio Archipelago. (1,578, 80). The middle lower premolar quite as in typical *hasselti*.

Leuconoe horsfieldi, Temm.

♂ in al. Jugra, Selangor.

♀ „ Selangor.

♀ „ Batu Burong, Pahang.

Kerivoula papillosa, Temm.

♂. ♀. Semangko Pass, Selangor.—Pahang Boundary, 2,700 ft.

A rare species. The British Museum contains examples from Cambodia (Mouhot) and Borneo (Everett). The specimens recorded from Calcutta (Pearson), now prove to be distinguishable and have been recently described as *K. lenis*, Thos.

Kerivoula hardwickei, Gray.

♀ Semangko Pass, Selangor.—Pahang Boundary.

Miniopterus medius, Thos. and Wrought.

2 skins and 12 in al. Pulau Kaban, E. Coast of Johore.

♂ in al. Terutau Id, West Coast, Malay Peninsula.

These specimens agree closely in size and coloration with the middle of the three species of *Miniopterus* collected in Java by G. C. Shortridge during the Balston Expedition.

Emballonura monticola, Temm.

Emballonura peninsularis, Miller, Proc. Acad. Nat. Sci. Philadelphia, 1898, p. 323; id. Proc. Biol. Soc. Washington, XIII, p. 193 (1900); Bonhote, Fasciculi Malayenses, Zool. I, p. 18 (1903); Kloss, Journ. F. M. S. Mus. II, p. 155 (1908); Thomas and Wroughton, Journ. F. M. S. Mus. IV, p. 110 (1909); Robinson and Kloss, Journ. F. M. S. Mus. V, p. 115 (1914).

Emballonura anambensis. Kloss, Journ. F. M. S. Mus. IV, p. 186 (1911).

25 in al. from various localities, including Aor and Tioman Is. Skins from Kao Nawng, Bandon (2); Bliah, Pulau Kundur (2); Pulau Tioman (1); and Kuala Lumpur (1).

***Taphozous melanopogon fretensis*, subsp. nov.**

Taphozous melanopogon, Cantor, Journ. Asiat. Soc. Bengal, 1846 p. 180; Flower P. Z. S., 1900 p. 347.

5 skins and 9 in al. Terutau Id. Straits of Malacca.

11 " 14 ,, Pulau Angsa, Coast of Selangor.

12 ,, Batu Caves, Selangor.

Essential characters as in true *melanopogon*, but colour both of fur and membranes far paler.

General colour above pale brown, near "avellaneous" of Ridgway, varying a good deal in intensity, the hairs white for the greater part of their length, avellaneous terminally, or with their extreme tips again light. Undersurface "drab grey," the black beard when present contrasting markedly with the general light colour of the underside. In some specimens the brown parts of the upper hairs may be considerably darker, but never or very rarely as dark as in ordinary *melanopogon*, the average colour of all Peninsular and Straits specimens being conspicuously lighter. Membranes pale brown throughout.

Dimensions of type:—Forearm 60 mm.

Head and body (measured in flesh) 80; tail 25, ear 17. Skull, greatest length 21; condyle to front of canines 20, front of canine to back of m^3 9.

Habitat. Islands and coast of the Straits of Malacca. Type from Pulau Terutau.

Type. Adult male. F. M. S. Mus. No. 391/12. Original number 5.163. Collected 1st December, 1912 by native collector.

The light colour of the fine series of this bat is in striking contrast to its dark hues elsewhere. A large number of specimens are in the British Museum from other parts of the range of *T. melanopogon*; but none show the peculiar pallor of the present set. The Terutau specimens average on the whole the lightest, then those from Pulau Angsa, and the Batu Caves, Selangor. Other peninsular examples, of which there are few available, appear to average rather darker than in the extreme of *fretensis*, lighter than in true *melanopogon*.

***Taphozous leucopleurus albipinnis*, Phos.**

Taphozous longimanus albipinnis, Thomas, Ann. and Mag. Nat. Hist. Ser. 7, II, p. 246 (1898). Thomas & Wroughton, Journ. F.M.S. Mus. IV, p. 110 (1909).

Taphoxous longimanus, Bonh. Fascic. Mal. Zool. 1, p. 18 (1903).

♂ Taiping. S. M. 1,054.

As noted in my recent paper on *Taphoxous*,* the peninsular representation of the *longimanus* group agrees best with the Bornean *T. l. albipinnis*, Thos.

CHIROMELES TORQUATUS, Horsf.

Chiromeles torquatus, Flower, P.Z.S., 1900, p. 350; Thomas and Wroughton, Journ. F.M.S. Mus. IV, p. 110 (1909).

2 in al. Terutau Id.

5 sk. Juara Bay, Pulau Tioman.

♀ Krian Rd., Larut, Perak. 923/11.

* Journ. Bombay Nat. Hist. Soc. XXIV, p. 50 (1913).

II. A NOTE ON THE VARIATION OF A LOCAL RACE OF *EPIMYS RATTUS*, *EPIMYS RATTUS JARAK* (BONHOTE), FROM PULAU JARAK. STRAITS OF MALACCA.

By H. C. ROBINSON, C.M.Z.S.

In an earlier number of this journal (vol. I, pp. 70, 71 (1905), Mr. J. L. Bonhote described this rat on a single specimen obtained by me in December, 1904.

The author regarded it as a race of the Sumatran *E. muelleri* (Jentink), but the acquisition of large series of closely allied forms both from the mainland and from various groups of islands show that it is rather to be regarded as a form of the cosmopolitan *E. rattus*.

In view of the fact that Pulau Jarak is very isolated and is practically never landed on, inasmuch as it possesses no beach and is steep to right up to the masses of granite boulders that form the shore, it is probable that the local rat population is hardly, if ever, contaminated by the introduction, whether by man or by natural agencies, of fresh blood. The race has therefore, in all probability, had time to attain a position of more or less stable equilibrium and I have therefore compiled the following tables based on a very considerable series obtained during two or three days in April, 1915.

The specimens were collected by two natives and were measured by them, but I have not thought it advisable to submit their figures to analysis as the personal error is probably large and variable and in so constant a race almost certainly masks the individual variation. It is, moreover, difficult to tell from skins whether the tails are really perfect, while the foot-measure, even for experienced European collectors, is subject to a personal or individual error, which is relatively considerable.

The measurements on the skulls have all been taken by myself with fine pointed dividers on a metal scale, the tenths of millimetres being estimated and in this connection it is well to consider the errors inherent to the methods of measurement, as they have considerable bearing on modern work in mammalogy, local races being often founded on small differences in measurements based on series which from a biometrical point of view are frequently small.

Masking errors may therefore be introduced from the following cases:—

- (1) A skull which has been comparatively recently cleaned, or which has been overboiled in the process of cleaning, will always give slightly larger measurements due to opening of the sutures; in the case of badly overboiled skulls this increase is permanent.

- (2) There is probably a small error due to backlash or spring in the dividers; this error is positive and is relatively greater in the smaller than in the larger measurements.
- (3) In the case of the measurement of total length old skulls may give a longer measurement than that really representing their morphological size due to the development of post-occipital ridges. The length is also increased at the anterior extremity in very old specimens owing to occasional ossification of the cartilage at the tips of the nasals.

In the case of the measurement of the length of the nasals an element of uncertainty is often introduced by the irregularity of the suture with the frontal. This error may be either positive or negative.

In the Zygomatic breadth, a negative (i.e. the measurement obtained is too small) error is introduced by the spring of the zygomatic arches.

The Diastema is affected by the position of the roots of the anterior premolars which spread forward to a variable degree. This error also is negative.

The tooth-row measurement, which is taken on the alveolus, is affected in the same way, though the error in this case is positive (i.e. the result is too large); and also in old skulls by actual absorption of the teeth when the sign is negative. This is not very marked in most rats but the genus *Rhinosciurus* (*Sciuridae*) may be cited as an extreme case.

The specimens which have been measured, have been selected as adult, those specimens which show no signs whatever of wear on the molars having been rejected.

The arithmetic mean error, the error of mean square or Standard Deviation of Pearson have been calculated as also the Coefficient of Variation. It will be noted that the measurements in all cases, if plotted, form curves of a symmetrical type, the arithmetic mean agreeing very closely with the Median.

In the case of the upper tooth-row I have not given the standard deviation or the arithmetic mean error as the measurement does not admit of sufficient accuracy to give consistent results, the actual dimensions being very small and the normal variation being apparently contained within very narrow limits.

Table I. Measurements of *Epimys rattus jarak*
(Bonhote)

Adult males.

Table II.

Do.

Adult females.

Table III. Measurements of skulls of *Epimys rattus jarak*
(Bonhote)

Total length = 100

Adult males.

Table IV.

Do.

Adult females.

Table V. Skull Measurements of *Epimys rattus jarak*
(Bonhote)
column.

| | | | |
|--------------------------|-----|-----|---|
| Arithmetic Mean | ... | ... | 3 |
| Median | ... | ... | 4 |
| Arithmetic Mean Error | | .. | 5 |
| Standard Deviation | | ... | 6 |
| Coefficient of Deviation | | .. | 7 |

Abbreviations used in Tables.

M = much.

V = very.

Ml = moderately.

Sl = slightly.

TABLE I.
MEASUREMENTS OF *Epimys rattus jarak* (BONHOTE), IN MILLIMETRES.
Adult Males.

| Body. | | | | SKULL. | | | | | Condition of teeth. | F. M. S. No. |
|----------------|-------|-----------|------|---------------|------------------------|----------|-------------------|------------------|---------------------|--------------|
| Head and Body. | Tail. | Hindfoot. | Ear. | Total Length. | Condylobasilar length. | Diastema | Zygomatic Breadth | Length of Nasals | Upper molar series. | |
| 175 | 165 | 31 | 20 | .. | 35.9 | 11.9 | 19.5 | 15.0 | 6.3 | 161/15 |
| 165 | 175 | 34 | 20 | 42.0 | 37.4 | 12.1 | 20.0 | 16.0 | 6.2 | 94/15 |
| 165 | 173 | 30 | 20 | 42.0 | 36.2 | 11.9 | 19.1 | 15.2 | 6.7 | 134/15 |
| 170 | 182 | 32 | 21 | 41.8 | 36.7 | 12.2 | 20.8 | 15.9 | 6.2 | 205/15 |
| 178 | 172 | 32 | 20 | 41.3 | 36.8 | 12.0 | 20.1 (app) | 15.7 | 6.0 | 132/15 |
| 169 | 175 | 30 | 19 | 41.2 | 36.0 | 11.8 | 19.9 | 15.8 | 6.6 | 135/15 |
| 159 | 182 | 34 | 20 | 41.0 | 36.3 | 11.8 | 19.2 | 15.0 | 6.3 | 93/15 |
| 158 | 160 | 32 | 21 | 41.0 | 36.2 | 11.8 | 19.7 | 15.2 | 6.2 | 173/15 |
| 165 | 158 | 31 | 20 | 41.0 | 36.2 | 12.1 | 19.9 | 15.0 | 6.1 | 167/15 |
| 184 | 188 | 32 | 21 | 41.0 | 36.8 | 11.8 | 19.4 | 15.2 | 6.3 | 250/15 |
| 175 | 183 | 32 | 21 | 40.9 | 36.1 | 11.2 | 19.2 | 15.1 | 6.2 | 214/15 |
| 187 | 189 | 32 | 21 | 40.9 | 36.1 | 11.2 | 19.2 | 15.1 | 6.2 | 221/15 |
| 171 | 158 | 31 | 20 | 40.8 | 36.1 | 11.8 | 19.1 | 15.0 | 6.1 | 179/15 |
| 163 | 190 | 31 | 20 | 40.8 | 36.0 | 11.7 | 19.2 | 15.0 | 6.3 | 105/15 |
| 168 | 193 | 32 | 20 | 40.7 | 37.0 | 11.8 | 19.9 | 15.1 | 6.5 | 102/15 |
| 175 | 182 | 31 | 21 | 40.6 | 36.2 | 11.8 | 19.4 | 15.0 | 6.3 | 156/15 |
| 174 | 182 | 31 | 19 | 40.3 | 36.0 | 12.0 | 19.0 | 15.1 | 6.2 | 128/15 |
| 176 | 187 | 32 | 20 | 40.3 | 36.0 | 11.9 | 19.2 | 15.1 | 6.1 | 127/15 |
| 161 | 176 | 32 | 20 | 40.2 | 36.0 | 11.7 | 19.4 (a) | 14.9 | 6.2 | 90/15 |
| 178 | 175 | 32 | 21 | 40.2 | 35.3 | 11.4 | 19.9 | 15.0 | 6.2 | 188/15 |
| 168 | 163 | 31 | 21 | 40.2 | 35.4 | 11.6 | 18.2 | 15.1 | 6.0 | 200/15 |
| 180 | 165 | 32 | 21 | 40.2 | 35.2 | 11.1 | 19.3 | 15.0 | 6.0 | 206/15 |
| 175 | .. | 31 | 20 | 40.2 | 36.2 | 11.7 | 19.3 | 14.7 | 6.1 | 210/15 |
| 168 | [152] | 33 | 19 | 40.1 | 35.2 | 11.3 | 19.2 | 15.0 | 6.1 | 154/15 |
| 183 | .. | 33 | 21 | 40.1 | 36.7 | 12.0 | 19.9 | 14.3 | 6.1 | 184/15 |
| 160 | .. | 34 | 20 | 40.1 | 36.0 | 11.3 | 19.2 | 14.6 | 6.2 | 98/15 |
| 154 | 184 | 31 | 19 | 40.1 | 35.7 | 11.3 | 19.0 | 14.3 | 6.2 | 97/15 |
| 162 | 185 | 33 | 20 | 40.0 | 35.8 | 11.7 | 19.8 | 14.9 | 6.1 | 89/15 |

TABLE I—Continued.

MEASUREMENT OF *Epimys rattus* jarak (BONHOTE), IN MILLIMETRES.

Adult Males.

| Head and Body. | Body | | | Skull | | | | | Condition of teeth. | F M. S No | |
|----------------|-------|-----------|-----|--------------|--------------------------|-----------|-------------------|------------------|---------------------|-------------|---------------------|
| | Tail. | Hindfoot. | Ear | Total Length | Condyllo-basilar length. | Diastema. | Zygomatic Breadth | Length of Nasals | | | Upper molar series. |
| 158 | 186 | 32 | 19 | 40.0 | 35.6 | 11.1 | 19.7 | 14.8 | 6.0 | V. sl. worn | 96/15 |
| 172 | 184 | 32 | 21 | 40.0 | 36.4 | 11.9 | 19.2 | 15.0 | 6.2 | M | 104/15 |
| 185 | 185 | 32 | 21 | 40.0 | 35.8 | 12.1 | 19.8 | 15.0 | 6.0 | " | 278/15 |
| 175 | 162 | 31 | 20 | 40.0 | 35.0 | 11.2 | 19.2 | 14.7 | 6.1 | Sl | 143/15 |
| 160 | 175 | 30 | 20 | 40.0 | 35.1 | 11.3 | 19.6 | 14.6 | 6.2 | " | 129/15 |
| 173 | 178 | 31 | 20 | 40.0 | 35.6 | 11.7 | 19.2 | 15.0 | 6.0 | " | 273/15 |
| 168 | 175 | 31 | 20 | 40.0 | 35.3 | 11.4 | 19.2 | 15.0 | 6.2 | Sl | 213/15 |
| 180 | 193 | 32 | .. | 39.9 | 35.2 | 11.2 | 19.7 | 14.9 | 6.2 | Not | 122/15 |
| 165 | .. | 32 | 20 | 39.8 | 35.8 | 11.7 | .. | 15.0 | 6.1 | " | 157/15 |
| 183 | 162 | 31 | 20 | 39.8 | 35.6 | 11.2 | 19.4 | 14.7 | 6.1 | V. | 202/15 |
| 172 | 178 | 30 | 20 | 39.8 | 35.9 | 11.3 | 19.1 | 14.5 | 6.3 | Not | 123/15 |
| 185 | 193 | 32 | 21 | 39.6 | 35.7 | 11.2 | 19.0 | 14.6 | 6.3 | Ml | 209/15 |
| 165 | 160 | 30 | 20 | 39.5 | 35.0 | 11.2 | 19.4 | 14.5 | 6.1 | " | 279/15 |
| 175 | 168 | 32 | 21 | 39.3 | 35.0 | 11.2 | 19.0 | 14.4 | 6.1 | " | 203/15 |
| 155 | 183 | 32 | 19 | 39.3 | 35.3 | 11.2 | 18.8 | 14.7 | 6.1 | Sl | 95/15 |
| 168 | .. | 31 | 20 | 39.2 | 34.8 | 11.1 | 18.5 | 15.0 | 6.2 | " | 274/15 |
| 165 | 154 | 30 | 20 | 39.2 | 35.1 | 11.2 | 19.5 | 14.4 | 6.3 | " | 272/15 |
| 183 | 180 | 32 | 21 | 39.2 | 35.2 | 11.2 | 19.1 | 14.4 | 6.2 | Not | 277/15 |
| 173 | 180 | 32 | 21 | 39.2 | 35.8 | 11.4 | 19.2 | 14.8 | 6.3 | " | 183/15 |
| 159 | 185 | 32 | 19 | 39.2 | 35.2 | 11.9 | 18.4 | 14.6 | 6.0 | Sl. | 101/15 |
| 165 | 159 | 29 | 20 | 39.2 | 35.0 | 11.0 | 19.0 | 14.1 | 6.1 | Not | 136/15 |
| 187 | 189 | 32 | 21 | 39.1 | 35.1 | 10.7 | 18.9 | 14.3 | 6.3 | Ml. | 222/15 |
| 160 | 178 | 30 | 20 | 39.1 | 35.0 | 11.5 | 19.3 | 14.3 | 6.1 | " | 121/15 |
| 168 | 184 | 31 | 21 | 39.0 | 35.0 | 11.2 | 18.9 | 14.8 | 6.1 | Not | 170/15 |
| 152 | 162 | 31 | 19 | 39.0 | 34.8 | 11.2 | 18.1 | 14.9 | 5.9 | V. | 108/15 |
| 173 | .. | 31 | 20 | 39.0 | 35.0 | 10.9 | 19.2 | 14.0 | 6.1 | " | 182/15 |
| 168 | 144 | 31 | 20 | 38.9 | 34.1 | 11.0 | 18.3 | 14.8 | 5.9 | Sl | 212/15 |
| 158 | 180 | 29 | 20 | 38.9 | 35.0 | 11.2 | 19.1 | 14.4 | 6.1 | M. | 103/15 |

TABLE II.
MEASUREMENTS OF *Epimys rattus* jarak (BONHOTE), IN MILLIMETRES.
Adult Females.

| Head and Body. | Body | | | Total Length. | Skull | | | | | Condition of Teeth. | F. M. S. No |
|----------------|-------|-----------|------|---------------|--------------------------|----------|-------------------|------------------|--------------------|---------------------|-------------|
| | Tail | Hindfoot. | Ear. | | Condyllo-Basilar Length. | Diastema | Zygomatic Breadth | Length of Nasals | Upper Molar Series | | |
| 185 | 198 | 33 | 22 | 43.0 | 37.1 | 12.0 | 19.8 | 15.7 | 6.6 | Worn | 250/15 |
| 170 | 108 | 32 | 21 | 42.3 | 37.1 | 11.9 | 19.4 | 15.6 | 6.3 | " | 120/15 |
| 170 | [165] | 30 | 19 | 41.6 | 36.8 | 12.4 | 20.0 | 15.4 | 6.3 | M. | 131/15 |
| 165 | 185 | 31 | 19 | 41.2 | 36.1 | 12.0 | 20.1 | 15.1 | 6.4 | " | 130/15 |
| 175 | 173 | 31 | 20 | 41.1 | 36.9 | 12.0 | 20.3 | 15.2 | 6.4 | " | 275/15 |
| 179 | 185 | 32 | 21 | 40.9 | 36.4 | 12.0 | 20.0 | 15.1 | 6.1 | " | 249/15 |
| 160 | 192 | 33 | 21 | 40.8 | 36.0 | 12.0 | 19.3 | 15.2 | 6.2 | Sl. | 158/15 |
| 168 | 180 | 30 | 20 | 40.8 | 36.3 | 11.9 | 19.7 | 15.1 | 6.1 | Sl. | 251/15 |
| 170 | 178 | 31 | 20 | 40.8 | 36.1 | 11.6 | 19.9 | 14.9 | 6.2 | V | 270/15 |
| 165 | 185 | 34 | 19 | 40.2 | 36.0 | 11.5 | 20.3 | 14.9 | 6.1 | " | 86/15 |
| 162 | .. | 31 | 19 | 40.2 | 35.9 | 11.3 | 19.9 | 14.5 | 6.1 | " | 91/15 |
| 175 | 190 | 31 | 20 | 40.2 | 36.1 | 12.0 | 20.3 (app.) | 15.0 | 6.1 | V. | 124/15 |
| 162 | .. | 31 | 20 | 40.2 | 36.0 | 11.9 | 19.2 | 14.8 | 6.1 | M. | 246/15 |
| 171 | .. | 31 | 20 | 40.1 | 35.0 | 10.9 | 19.7 | 14.0 | 6.1 | M. | 280/15 |
| 170 | 158 | 30 | 20 | 40.1 | 35.7 | 11.2 | 19.6 | 14.9 | 6.3 | " | 247/15 |
| 166 | 155 | 31 | 20 | 40.0 | 35.8 | 12.0 | 19.1 | 14.0 | 5.9 | V. | 168/15 |
| 175 | 183 | 32 | 21 | 40.0 | 35.2 | 11.1 | 19.8 | 14.2 | 6.2 | " | 245/15 |
| 168 | .. | 31 | 20 | 40.0 | 35.2 | 11.2 | 19.6 | 13.9 | 6.1 | V. | 284/15 |
| 182 | 168 | 30 | 18 | 39.9 | 35.1 | 11.4 | 20.0 | 14.4 | 6.1 | " | 87/15 |
| 165 | 155 | 30 | 20 | 39.9 | 36.2 | 12.1 | 20.2 | 15.0 | 6.1 | " | 259/15 |
| 175 | 170 | 30 | 20 | 39.9 | 35.0 | 11.2 | 19.3 | 14.2 | 6.1 | Not | 253/15 |
| 165 | 183 | 30 | 19 | 39.9 | 36.0 | 11.8 | 20.0 | 14.9 | 6.2 | Not | 106/15 |

TABLE II—Continued.
 MEASUREMENTS OF *Epimys rattus jarak* (BONHOTE), IN MILLIMETRES.
Adult Females.

| Head and Body. | Body | | | SKULL | | | | | Condition of Teeth | F M S No |
|----------------|------|----------|-----|--------------|------------------------|----------|-------------------|------------------|--------------------|----------|
| | Tail | Hindfoot | Ear | Total Length | Condyl.-basilar Length | Diastema | Zygomatic Breadth | Length of Nasals | Upper Molar Series | |
| 165 | 180 | 31 | 20 | 39 8 | 35 0 | 11 1 | 19 4 | 14 7 | 6 1 | 207/5 |
| 174 | 168 | 30 | 20 | 39 8 (app) | 30 0 | 12 0 | 19 5 | 15 1 (app) | 6 1 | 260/15 |
| 168 | 156 | 32 | 20 | 39 7 | 35 0 | 11 6 | 19 5 | 14 4 | 6 1 | 201/15 |
| 165 | 160 | 31 | 21 | 39 5 | 35 3 | 11 7 | 20 0 (app) | 13 0 | 6 2 | 255/15 |
| 179 | 175 | 32 | 21 | 39 4 | 35 1 | 10 9 | 19 8 | 14 8 | 6 0 | 163/15 |
| 176 | 182 | 32 | .. | 39 2 | 35 0 | 11 6 | 19 4 | 14 2 | 6 1 | 181/15 |
| 174 | 169 | 32 | 21 | 39 2 | 35 2 | 11 0 | 20 0 | 14 9 | 6 3 | 164/15 |
| 166 | 185 | 30 | 20 | 39 1 | 35 0 | 11 0 | 19 0 | 14 0 | 6 2 | 189/15 |
| 160 | .. | 31 | 20 | 39 1 | 35 6 | 11 4 | 19 2 | 14 5 | 6 0 | 254/15 |
| 167 | 173 | 31 | 20 | 39 1 | 35 0 | 11 3 | 19 4 | 15 0 | 6 0 | 216/15 |
| 173 | .. | 30 | 20 | 39 1 | 35 2 | 11 7 | 9 6 | 14 4 | 6 0 | 211/15 |
| 158 | .. | 30 | 20 | 39 0 (app) | 34 9 | 11 9 | 19 0 | 14 2 (app) | 5 9 | 282/15 |
| 155 | 154 | 30 | 20 | 39 0 | 34 1 | 11 1 | 20 0 | 14 8 | 6 1 | 171/15 |
| 155 | 175 | 29 | 19 | 38 9 | 35 0 | 10 9 | 19 8 | 14 1 | 6 0 | 88/15 |
| 175 | 188 | 31 | 20 | 38 9 | 35 0 | 10 9 | 8 6 | 14 1 | 6 1 | 258/15 |
| 155 | 169 | 31 | 19 | 38 9 | 34 1 | 11 0 | 18 8 | 14 1 | 6 2 | 119/15 |
| 167 | 170 | 30 | 20 | 38 3 | 34 1 | 11 0 | 18 8 | 14 2 | 6 2 | 215/15 |
| 160 | 172 | 30 | 20 | 38 1 | 33 9 | 11 2 | 18 2 | 14 1 | 6 1 | 248/15 |

TABLE III.
MEASUREMENTS OF SKULLS OF ADULT MALES OF *Epimys rattus jarak* (BONHOTE).
TOTAL LENGTH = 100.

| Condyllo-basilar Length. | Diastema. | Zygomatic Breath | Length of Nasals | Upper Molar Series. | Condition of Teeth. | F M S No |
|--------------------------|-----------|------------------|------------------|---------------------|---------------------|----------|
| 89.0 | 28.8 | 47.6 | 38.2 | 14.8 | V worn | 161/15 |
| 86.2 | 28.3 | 45.5 | 36.2 | 16.0 | " | 94/15 |
| 87.7 | 29.2 | 49.8 | 38.0 | 14.8 | " | 134/15 |
| 89.1 | 29.0 | 48.7 | 36.6 | 14.5 | " | 205/15 |
| 87.4 | 28.6 | 48.3 | 38.3 | 16.0 | V | 132/15 |
| 88.5 | 28.8 | 46.8 | 36.6 | 15.4 | Moderately | 135/15 |
| 88.3 | 28.8 | 48.0 | 37.1 | 15.1 | Sl | 93/15 |
| 88.3 | 29.5 | 48.6 | 36.5 | 14.9 | M | 173/15 |
| 89.8 | 28.8 | 47.4 | 37.3 | 15.4 | Sl | 167/15 |
| 89.9 | 29.8 | 48.9 | 37.2 | 15.4 | " | 56/15 |
| 88.3 | 27.4 | 46.9 | 36.9 | 14.9 | Sl | 214/15 |
| 88.5 | 28.8 | 46.8 | 36.8 | 14.9 | " | 221/15 |
| 88.2 | 28.7 | 47.0 | 36.8 | 15.4 | Sl | 179/15 |
| 89.9 | 28.9 | 48.9 | 37.1 | 15.9 | " | 105/15 |
| 89.0 | 28.0 | 47.7 | 36.8 | 15.5 | " | 102/15 |
| 89.4 | 29.8 | 47.1 | 37.5 | 15.5 | " | 156/15 |
| 89.4 | 29.5 | 47.6 | 34.9 | 15.4 | " | 128/15 |
| 89.6 | 20.1 | 48.3 | 37.0 | 15.1 | Sl | 127/15 |
| 87.8 | 28.3 | 49.4 | 37.3 | 15.4 | " | 90/15 |
| 88.0 | 28.8 | 45.4 | 37.3 | 15.1 | " | 188/15 |
| 87.8 | 27.6 | 47.9 | 37.7 | 14.8 | " | 200/15 |
| 90.0 | 29.1 | 48.1 | 37.3 | 14.8 | " | 206/15 |
| 87.8 | 28.2 | 47.7 | 36.6 | 15.2 | V | 210/15 |
| 91.5 | 29.9 | 49.5 | 37.4 | 15.2 | " | 154/15 |
| 89.8 | 28.2 | 47.9 | 35.6 | 15.4 | Sl. | 184/15 |
| 89.0 | 28.2 | 47.4 | 35.7 | 15.2 | " | 98/15 |
| 89.5 | 29.3 | 49.5 | 37.3 | 15.5 | V. sl | 97/15 |
| | | | | 15.3 | M | 89/15 |

TABLE III—Continued.
MEASUREMENTS OF SKULLS OF ADULT MALES OF *Epimys rattus jarak* (BONHOTE).

TOTAL LENGTH = 100.

| Candylo-basilar Length | Diastema | Zygomatic | Length of Nasals | Upper Molar Series | Condition of Teeth | F M S No |
|------------------------|----------|-----------|------------------|--------------------|--------------------|----------|
| 89 | 27 8 | 49 3 | 37 | 15 5 | V sl worn | 96/15 |
| 91 | 29 8 | 48 | 37 5 | 15 5 | M " | 104/15 |
| 89 4 | 30 3 | 49 4 | 37 5 | 15 0 | " " | 278/15 |
| 87 5 | 28 5 | 48 0 | 36 8 | 15 2 | SI " | 143/15 |
| 88 0 | 28 3 | 49 0 | 36 5 | 15 5 | " " | 129/15 |
| 89 0 | 29 2 | 48 0 | 37 5 | 15 0 | " " | 273/15 |
| 88 3 | 28 5 | 48 0 | 37 5 | 15 4 | SI " | 213/15 |
| 88 2 | 28 0 | 49 4 | 37 3 | 15 3 | Not | 122/15 |
| 90 0 | 29 3 | — | 37 7 | 15 4 | W " | 157/15 |
| 89 4 | 28 1 | 48 7 | 36 9 | 15 3 | V " | 202/15 |
| 90 2 | 28 4 | 47 9 | 36 4 | 15 8 | Not | 123/15 |
| 89 9 | 28 2 | 47 7 | 36 9 | 15 8 | " " | 209/15 |
| 88 7 | 28 4 | 49 0 | 36 8 | 12 2 | MI " | 279/15 |
| 89 0 | 28 5 | 48 3 | 36 6 | 15 5 | " " | 203/15 |
| 89 8 | 28 5 | 47 8 | 37 4 | 15 5 | SI " | 93/15 |
| 88 7 | 28 3 | 47 2 | 38 2 | 15 8 | " " | 274/15 |
| 89 5 | 28 5 | 49 5 | 36 7 | 16 1 | " " | 272/15 |
| 89 8 | 28 6 | 48 6 | 36 7 | 15 8 | Not | 277/15 |
| 91 3 | 29 0 | 48 9 | 37 8 | 16 0 | " " | 183/15 |
| 89 8 | 30 4 | 46 9 | 37 2 | 15 3 | SI " | 10 /15 |
| 86 7 | 27 3 | 48 5 | 35 9 | 15 6 | Not | 136/15 |
| 89 9 | 30 7 | 47 2 | 36 6 | 16 1 | MI " | 221/15 |
| 89 5 | 29 4 | 49 4 | 36 6 | 15 6 | " " | 121/15 |
| 89 7 | 28 7 | 48 5 | 37 9 | 15 6 | Not | 170/15 |
| 89 2 | 28 7 | 46 4 | 38 2 | 15 1 | V " | 108/15 |
| 89 7 | 27 9 | 49 3 | 36 0 | 15 6 | " " | 182/15 |
| 87 7 | 28 4 | 47 2 | 38 2 | 15 1 | SI " | 212/15 |

TABLE IV.
MEASUREMENTS OF SKULLS OF ADULT FEMALES OF *Epimys rattus jarak* (Bonhote).
TOTAL LENGTH = 100.

| Condyllo-basilar Length. | Diastema. | Zygomatic Breadth. | Length of Nasals. | Upper Molar Series | Condition of Teeth | F. M. S No |
|--------------------------|-----------|--------------------|-------------------|--------------------|--------------------|------------|
| 86.3 | 27.9 | 46.0 | 36.5 | 15.3 | Worn | 250/15 |
| 87.7 | 28.1 | 45.8 | 36.9 | 14.9 | " | 120/15 |
| 88.5 | 29.8 | 48.0 | 37.0 | 15.1 | " | 131/15 |
| 87.6 | 29.1 | 48.8 | 36.7 | 15.5 | " | 130/15 |
| 89.8 | 29.2 | 49.4 | 36.9 | 15.6 | " | 257/15 |
| 88.9 | 29.3 | 48.9 | 36.9 | 14.9 | Sl. | 249/15 |
| 88.2 | 29.4 | 47.3 | 37.3 | 15.2 | Sl. | 198/15 |
| 88.9 | 29.1 | 48.3 | 37.0 | 14.9 | " | 251/15 |
| 88.5 | 28.4 | 48.8 | 36.5 | 15.2 | V. | 270/15 |
| 89.6 | 28.6 | 50.5 | 37.0 | 15.2 | " | 86/15 |
| 89.3 | 28.1 | 49.5 | 36.3 | 15.2 | " | 91/15 |
| 89.8 | 29.9 | 50.5 | 39.8 | 15.2 | V | 121/15 |
| 89.6 | 29.6 | 47.8 | 36.8 | 15.2 | M. | 216/15 |
| 87.3 | 27.2 | 49.1 | 31.9 | 15.2 | M | 280/15 |
| 89.0 | 27.9 | 48.9 | 37.2 | 15.2 | V | 247/15 |
| 89.5 | 30. | 47.8 | 35. | 14.6 | " | 168/15 |
| 88. | 27.8 | 49.5 | 35.5 | 15.5 | " | 215/15 |
| 88. | 28. | 49 | 34.8 | 15.3 | V | 284/15 |
| 87.9 | 28.6 | 50.1 | 36.0 | 15.3 | " | 87/15 |
| 90.7 | 30.3 | 50.6 | 37.6 | 15.3 | " | 259/15 |
| 87.7 | 28.0 | 48.4 | 35.6 | 15.3 | " | 253/15 |
| 90.2 | 29.6 | 50.1 | 37.3 | 15.5 | Not | 106/15 |
| 87.9 | 27.9 | 48.7 | 36.9 | 15.3 | Not | 207/15 |
| 90.5 | 30.2 | 48.9 | 37.9 | 15.3 | Sl. | 260/15 |
| | | | | | M. | |

TABLE IV—*Continued*
 MEASUREMENTS OF SKULLS OF ADULT FEMALES OF *Epimys rattus jarak* (BONHOTE).
 TOTAL LENGTH = 100.

| Condyl.-basilar Length | Diastema | Zygomatic Breadth | Length of Nasals | Upper Molar Series | Condition of Teeth | F | M | S | No |
|---------------------------|----------|-------------------|------------------|--------------------|--------------------|---|---|---|--------|
| 88.2 | 29.3 | 49.3 | 36.3 | 15.3 | M worn | | | | 201/15 |
| 89.4 | 29.6 | 5.6 | 35.2 | 15.2 | V | | | | 255/15 |
| 89.0 | 27.7 | 50.3 | 37.6 | 15.2 | Sl | | | | 163/15 |
| 81.3 | 29.6 | 43.5 | 36.2 | 15.6 | M | | | | 181/15 |
| 89.5 | 28.0 | 51.0 | 38.0 | 6.0 | M | | | | 164/15 |
| 89.5 | 28.1 | 48.0 | 35.8 | 15.8 | V sl | | | | 183/15 |
| 91.0 | 29.2 | 49.1 | 37.0 | 15.3 | | | | | 254/15 |
| 89.5 | 28.9 | 49.6 | 38.4 | 15.3 | M | | | | 216/15 |
| 90.0 | 29.9 | 50.1 | 36.8 | 15.3 | M | | | | 211/15 |
| 89.5 | 27.9 | 48.7 | 36.4 | 5.1 | | | | | 282/15 |
| 87.4 | 28.5 | 51.3 | 37.9 | 15.6 | M | | | | 171/15 |
| 89.0 | 28.0 | 50.9 | 36.2 | 15.4 | Sl | | | | 5/15 |
| 81.9 | 28.0 | — | 36.2 | 15.7 | V sl | | | | 258/15 |
| 8-7 | 28.3 | 48.3 | 36.2 | 15.9 | Sl | | | | 119/5 |
| 81.0 | 28.7 | 9.0 | 37.0 | 16.2 | Not | | | | 215/15 |
| 88.9 | 29.4 | 47.3 | 37.0 | 16.0 | Sl | | | | 245/15 |

TABLE V.

| | Sex | No of observations | Arithmetic Mean | Median | Arithmetic Mean error | Standard Deviation | Coefficient of Variation |
|----------------------------|-----|-----------------------|--------------------|--------|--------------------------|-----------------------|-----------------------------|
| | | | m m | | m m | m m | |
| Total length .. | ♂ | 55 | 40.06 | 40.0 | 63 | 77 | .019 |
| Total length .. | ♀ | 40 | 39.93 | 39.9 | 738 | 1.00 | .025 |
| Condyllo-basilar length .. | ♂ | 56 | 36.0 | 35.8 | 596 | 758 | .021 |
| Condyllo-basilar length .. | ♀ | 40 | 35.5 | 35.3 | 668 | 792 | .022 |
| Diastema .. | ♂ | 56 | 11.5 | 11.5 | 304 | 374 | .032 |
| Diastema .. | ♀ | 40 | 11.5 | 11.5 | 392 | 453 | .039 |
| Zygomatic breadth .. | ♂ | 55 | 19.3 | 19.2 | 365 | 491 | .025 |
| Zygomatic breadth .. | ♀ | 40 | 19.6 | 19.7 | 377 | 467 | .024 |
| Length of Nasals .. | ♂ | 56 | 14.9 | 14.9 | 300 | 404 | .027 |
| Length of Nasals .. | ♀ | 40 | 14.65 | 14.7 | 435 | 492 | .033 |

III. ON AN ABERRATION OF *SCIURUS PREVOSTI* *PREVOSTI* FROM SOUTH WESTERN PAHANG.

By HERBERT C. ROBINSON, C.M.Z.S.

Three races of the handsome Raffles squirrel are recognizable in the Malay Peninsula, two very distinct, and the third somewhat indefinite both in range and characters.

These are

Sciurus prevostii prevostii, Desm.

Desm. *Mamm.* p. 335 (1822).

Range. The Southern portion of the Malay Peninsula not north of a line drawn from the northern border of the territory of Malacca to Kuala Kurau on the Pahang River.

This form is at once distinguishable by having the white side stripe continuous from ankle to ear over the shoulder.

Sciurus prevostii wrayi, Kloss.

Kloss, *Journ. Fed. Malay States Mus.* iv, p. 148 (1911).

Range. From the Siamese Malay State of Trang, through the districts of Selama and Temengoh in northern Perak and across the main range of the Peninsula to the headwaters of the Pahang and Tahan Rivers. Range northwards on the east side of the Peninsula not yet determined.

This form is separable from the other two by having a wash of ochraceous fulvous on the shoulder, thereby breaking the continuity of the white lateral stripe. In the next race this wash is almost as deep in colour as the feet.

Sciurus prevostii humei, Bonhote.

Bonhote, *Ann. and Mag. Nat. Hist.* (7) vii, p. 170 (1901).

Range. Central and Southern Perak to the south of Selangor.

In this form the ochraceous chestnut of the shoulder is broadly in contact with the black of the back.

Of the *first* race, *Sc. p. prevostii*, the Federated Malay States Museums, possess a series of skins from Nyalas, Malacca, which are practically topotypes of the species and call for no special remark. They have the hands and feet chestnut, the extremities of the fingers and toes sometimes rather paler, tending to orange buff; while in one case the feet near the ankle are clad with speckled black and grey hairs mingled with the chestnut, though this colouring is not symmetrical.

Two skins from Ayer Kring, Negri Sembilan, on the eastern watershed of the Peninsula (Nos. 239, 240/12) are typical, but a third has the speckled markings on the feet well developed, while there is a tendency to the same change on the hands. (No. 241/12).

But of seven skins from Triang, about 20 miles north from Ayer Kring, three, Nos. 475, 477, 480/12 are typical, though the feet are somewhat paler chestnut, while the others show marked variations.

One No. 479/12 has the hands and feet almost entirely white, the colour of the hands soiled with chestnut and the feet with a narrow ring of chestnut near the ankle. The bases of the hairs throughout black.

Another, No. 478/12 has the hands dull chestnut, intermixed with many black and silvery white hairs and the feet silvery, dark maroon towards the ankle. The point of the shoulder blackish and the shoulder above much sprinkled with blackish hairs so that the white lateral stripe appears partially interrupted. No. 476/12 is more nearly normal but has the feet decidedly paler chestnut and the feet dirty whitish on the distal phalanges, chestnut on the proximal. No. 481/12 differs in the greater extension of white down the forearm towards the fingers, which are orange, and in the paler tint of the feet, which are clad with buffy golden hairs towards their extremities.

These variations all occurring in specimens from one locality and which are not correlated apparently either with the age of the individual or with that of the pelage, which is fairly fresh and uniform in the whole series, appears to indicate a state of unstable equilibrium in the species, parallel to but on a smaller and less striking scale than that described by Messrs. Thomas & Wroughton in the Chindwin squirrels of the superspecies, *Callisciurus sladeni* Journ. Bomb. Nat. Hist. Soc. Bombay.

The facts are interesting and worthy of note and though I do not think that the creation of yet another subspecies is justified with existing material it may be permissible to borrow a method of nomenclature from the entomologists, and record the form as an aberration.*

***Sciurus prevostii*, subsp. *prevostii*.**

ab. *meticulosus*, aberrat. loc. nov.

Type of the Aberration. Adult female (skin and skull). F.M.S. Museums No. 479/12, collected on 9th September, 1912 by Museum Collector, at Triang, South-western Pahang.

Characters. Similar to *Sc. prevostii prevostii*, but having the white side stripe practically continuous from the tips of the fingers to the tips of the toes.

* Rothschild, Hartert and Jordan, Nov. Zool I. p. 1. (1894); *ibid.* sp. cit. II. p. 180, para 2. (1895).

Measurements (taken in flesh by native collectors) Head and body, 255; tail, 235; hindfoot, 52; ear, 22 mm.

Skull: Total length, 57.0; condylo-basilar length, 49.2; palatilar length, 23.9; diastema, 14.0; upper molar series including *pm.*³ 10.5; interorbital breadth, 22.4; cranial breadth, 24.8; zygomatic breadth, 35.1; median length of nasals, 19.1 mm.

Should this aberration, as will not improbably prove to be the case, be found to occur in a definite area to the exclusion of the normal form, it will, of course, have to be classed as a subspecies.

IV. NOTES ON THE SAKAI OF THE ULU KAMPAR. (Plates I—V).

By IVOR H. N. EVANS, B.A., *Assistant Curator and Ethnographical Assistant, F.M.S. Museums.*

The following notes are the results of rather over a month's work among the Sakai of the Kampar River, above Gopeng, in the Kinta district of Perak; my visit to these people having been made during the months of May and June, 1915. Starting from Gopeng on May 29th, a three miles walk, chiefly through old and new tin workings, took me to "Kampong Ulu Pipe," a Malay settlement, about three miles distant from Gopeng, which is close to Messrs. Osborne & Chappel's new pipe line. On the hills near this village can be seen several Sakai clearings, so, with the idea of getting into touch with their inhabitants and of learning something of the aborigines living round the headwaters of the Kinta River, I made a few days stay in this locality. With regard to my second intention, I met with very small success. The Malays of the settlement are all foreigners, Sumatra men, who have come into the country within the last twenty years or so, and know practically nothing of the district with the exception of their own village and the road to Gopeng. I could not even obtain from them the name of a conspicuous mountain, which was clearly to be seen from the village. The information I got from the local Sakai was almost as unsatisfactory as that from the Malays, since they also seemed to move only within a small radius in the region of the foot-hills. The country of the Pahang border was to them unexplored territory, and they seemed to have no intercourse with the aborigines of that district. These tame Sakai inhabit the Kinta Valley from about Gopeng to localities some little way above the dam on the big pipe-line, and also those of the Guroh and Geruntum (Kuntun on the map) Rivers, tributaries of the Kinta, while they have some intercourse with the people of Sungai Raia, who are said to differ slightly from them in dialect. This particular section of the Sakai, which cannot well be called a tribe, falls within the large division of the Central Sakai. The aborigines who live near Gopeng have adopted Malay fashions in dress, and the blow-pipe seems to be falling into disuse among them, as do also their ancient customs and beliefs.

Finding these people, therefore, too sophisticated to be likely to afford me much of interest, I moved to a Sakai settlement on the Kinta River, some two and a half miles above the dam on the large pipe-line, and some ten miles from Gopeng. Here I stayed for about a fortnight. Though the inhabitants of this settlement had been to a considerable

extent in contact with Malays and Chinese, they were much less civilized than the Sakai living closer to Gopeng. Si Busu the headman of the settlement, which consisted only of one small house, gave me a good deal of interesting information about customs and beliefs, and I also had with me a Sumatran Malay named Dana; he had a Sakai wife who told me a good deal about aboriginal affairs, though I did not accept his statements before verifying them by questioning the Sakai themselves.

Si Busu's settlement consisted of a rather small house, roofed and walled with palm leaves, which stood in a considerable clearing planted with tapioca. Access to the dwelling was gained by a bamboo ladder. The doorway could be closed with a sliding door of sheet bamboo, and on the left of this there was built out a small room, occupied by an old man; this had a window to the outside and another and a door opening into the house. A single large room occupied the rest of the space below, but above this, built out towards the back of the house and supported on high poles, was an upper room which was entered from below by means of a bamboo ladder. The cooking place, with its earthen floor, was built rather to one side of the large room and over it was a framework with shelves for storing firewood, cooking utensils, etc. The dart quivers belonging to the men of the house were hung against the uprights supporting the shelves. One or two store-bins for padi, made of tree-bark, were placed near the walls, while a space in one corner of the room, walled in to a height of about two and a half feet with tree-bark, but empty at the time of my visit, had also been used for holding padi grain. I spent a good deal of time in the house and was interested to notice that, unless asleep, the Sakai were never without occupation of some sort. Their appetites were insatiable, and shortly after a hearty meal of rice, gourd, and frogs or some other such delicacy, they would start roasting Indian corn or tapioca in the ashes of the fire. The consumption of Indian corn and tapioca, if the Sakai were at home, went on intermittently all day long. Apart from eating, the men occupied themselves in making stocks of blow pipe darts and snares for small game, or in repairing their casting nets; the women devoted themselves to the manufacture of mats and carrying baskets or the cutting and drying of tobacco, previously rolled leaves of the plant being shredded with a sharp sliver of bamboo on a billet of wood. This was placed on the slant, one end resting on the floor, the other against a wall of the house.

The clearing in which the house was situated had been planted in the previous year, the Sakai's custom being first to sow a new clearing with rice and then to plant tapioca, a much slower growing crop, among the rice. Thus, after the rice harvest is over, and most of the crop consumed, they are able to fall back on their tapioca, which by that time is sufficiently far advanced to be dug up.

It is not necessary to say anything about the blow-pipes or the dart-quivers generally in use among the Kampar Sakai, as they are of the same type as those of the aborigines of the Batang Padang District of Perak, which have been fully described by Skeat and others. One quiver, however, which was hanging from the posts supporting the shelves above the cooking place, immediately attracted my attention, since its cover was of quite a different type from the normal, being a hard and stiff cap of plaited rattan 17.5 cm. high. After a considerable amount of fruitless questioning I elicited the information that it had been bought from a Kinta River Sakai, and this of course explained its resemblance to the quivers used by the aborigines of the Kuala Kangsar and Upper Perak Districts.

CUSTOMS, RELIGIOUS BELIEFS AND SUPERSTITIONS.

I gathered from the Sakai living on the clearings around "Kampung Ulu Pipe" that they have some hazy idea of a Supreme Being or Deity (the sun), whom they call *Yenong*. This statement is supported by the information which Wilkinson obtained from one of the same people, whom he induced to live in Taiping for about three months. As among the Sakai of Sungkai and the Hill Sakai of the Temengoh District of Upper Perak, the shaman or magician is termed *Halak* and the familiar spirit, by whose aid he works his spells, his *Anak Yang*. It is said that formerly the body of a dead *Halak* was left unburied in the house where he died. I was also told that the *Halak's bumbun*, or round hut, is built within a dwelling house, and consists of seven *bertam* palm-leaves plaited together and fastened to form a circle within a rectangular frame of wood, which is attached to the posts of the shelves over the fire-place and to some of the posts of the house.

The rest of the information under this heading is derived from Si Busu and the people of his house.

First, I will give some account of various superstitions and tabus which influence the people's daily life. As among so many aboriginal tribes, lightning (*chilou*) and thunder are held in dread. The following actions are thought to cause thunder storms, and are therefore tabu.

- (1) To roast an egg in the fire.
- (2) To laugh if a snake is met with in the jungle.
- (3) To pull a jungle-leech off the body and burn it.

When a bad thunder storm comes on, the Sakai descend down from the house to the ground, strike their parangs into the earth and leave them there. Hot stones from the hearth, the supports for cooking pots, are also thrown out of the door of the house. Both these actions are thought to be helpful in dispersing the storm; and the hot stones, symbolically at any rate, dry up the rain.

Should anyone in the house, a child at play for instance, break off the tail of a lizard, each person cuts a piece of hair from his, or her, head, burns it in the fire, and then, after collecting the ashes, blows them through the hands, placed trumpet fashion before the mouth, saying: "Usah, usah gelebeh" (don't any more). If this were not done, the house would be struck by lightning.

We will next take some beliefs and customs connected chiefly with sickness.

If three men have planned to go on a journey or to fell jungle together, but one man remains at home without saying anything (i.e. excusing himself from going), and should one of the two companions fall sick, his illness is at once ascribed to the man who stopped behind. The two will immediately return, and the third man must say charms for the recovery of the patient. If, however, the man who stops at home makes some excuse for not going, no ill fortune encountered by his companions can be ascribed to him.

If a man throws away the end of a cigarette or some scraps of food, and what he throws away falls into a hole in a tree-stump, a mortar for pounding padi, the stump of a bamboo, or any place which holds, or can hold, water, and should he afterwards fall ill with pains in his stomach, he thinks that this action is the cause. He will, therefore, go to the place where he threw away the food fragments and remove them. If he did not do this, he would not recover from his illness.

If a man is sleeping in the jungle on the ground (or sometimes if he is living in his house), and falls sick with itchy feelings in his body or swellings, he will dig up the ground under his sleeping place, and if he finds an ants' nest will destroy it. The ants, so he thinks, have caused him to fall sick, and the destruction of the nest insures his recovery.

If a man who has been camping in the jungle falls sick, and should remember that he has left a pole of one of the shelters he has used standing in the ground, he will return and pull it up, otherwise he will not recover.

If a man sits down on a spot where the roots of two trees interlace he will fall sick: for places of this kind are the abodes of spirits.

If a man leans against a tree which has a creeper twining about it, he will become ill; for this tree is the dwelling place of a spirit. The sick man will, however, recover if he returns and cuts through the creeper.

Tabus with regard to mothers-in-law and fathers-in-law are in force. A man must avoid his mother-in-law as much as possible, and a woman her father-in-law.

Some very interesting information with regard to customs, now obsolete or nearly so, came to light during my conversations with Si Busu. He told me that he had seen

these observances practised while still a youth. In choosing a site for a new clearing, a kind of divination was practised to see whether the Earth Spirit would allow the ground to be used. When a suitable piece of ground had been chosen, the Sakai went to the site proposed for the new clearing and repeated some spells. They then swept all rubbish from a small plot of ground, and enclosed it within a frame made of four pieces of wood each about a foot and a half long. The pieces of wood were called *galang dapor*. Incense was burnt within the square, and, if much smoke arose from it, this was regarded as a sign that the padi crop would be plentiful. Next, little cups made of *lebak* leaves containing incense, water, *lebak* leaves and rice-flour were placed within the square. The man who performed the ceremony then covered the square over with leaves and everybody went home. If this man dreamed on that night that the place was not good another site was chosen for the clearing. Dreams about fire or of a piece of wood wrapped in a mat (i.e. a body ready for burial) were bad. Providing that the celebrant's dreams were favourable, the Sakai went the next morning to the clearing site and uncovered the square of ground which they had swept. If the ground under the covering of leaves was undisturbed, they looked upon this as a sign that they might make the proposed clearing, but if they found any adventitious substances under the leaves, such as rubbish of any kind, or twigs and scraps of wood, another site had to be chosen and the performance repeated. If some rubbish had merely fallen on the leaves covering the square, the clearing might be made, though this was regarded as a sign that somebody from another settlement would die in their house. If, however, a clearing were to be made after rubbish had been found under the covering leaves, it was thought that this would result in the death of a man of the house.

When the young padi has sprung up no bamboos or rattans must be cut near the clearing until the crop is ripe.

The season for sowing padi is when the *petai* fruits are ripe and the *durian* and *prah* nearly so.

Another curious Sakai superstition is that the earth must not be struck with a stick, this action being thought to irritate the Earth Spirit.

Tabu signs are hung up across the approaches to the clearing and outside the houses on the first day of padi sowing to warn the people from other settlements that they may not enter, but the tabu period is only for one day.

In making a clearing the first step is to cut away the undergrowth. This work proceeds for three days, and then a one day's stop is made. When the undergrowth has all been cleared the felling of the big trees begins, and here again after working for three days the Sakai rest for a day.

During the first three days of clearing undergrowth it is tabu to touch the chopping knife of a man who is engaged in-

the work. Similarly during the first three days of felling the big trees nobody may touch an adze belonging to another man.

At the time of the reaping of the padi crop the settlement is laid under certain tabus for a period of six days. During this period cigarettes may not be smoked nor blow-pipes and fish be brought into the houses. Tabu signs of palm leaves are hung up as a warning to outsiders not to visit the clearing. On the first day of reaping seven ears of padi, the rice-soul, are tied up, and incense burnt to them. These seven ears are left till reaping is finished, and round them sufficient padi to fill two or three reaping baskets, this being the rice-soul's companion. The rice-soul is finally reaped, and incense is burnt under the place where it is hung up for six days. After this the grain from the rice-soul and its companion are taken and mixed with the seed padi.

Si Busu also gave me a little information with regard to customs connected with child-birth. It appears that after a birth the navel cord is buried under the house. Should the child fall ill and its body appear swollen, the cord is dug up and inspected to see whether white or other ants are eating it. Should this be the case, the ants are killed with hot water and the cord is re-buried in another spot. If no ants are found, the cord is again interred in the same place.

After a woman has been delivered, spells are said over her, and when this has been done, she is allowed to eat every kind of food with the exception of chilies, which are forbidden to her for six days.

I was told that articles of property, not necessarily belonging to the deceased, and food are placed on a newly made grave, and that a fire is kindled, morning and evening, at the spot for the first six days after burial.

Contact with Malays and Chinese has tended to destroy the customs and beliefs of the Sakai living within easy reach of the settlements of these races. Consequently the Sakai around "Kampong Ulu Pipe" seem to have lost most of their distinctive customs, and the same is true in a less degree of those living above the dam. I gathered that some of the customs described above are obsolete or obsolescent among the people that I visited, though they probably remain in full force among the wilder aborigines in the headwaters of the Kampar River.

ABORIGINES OF THE PAHANG BOUNDARY.

Apart from the fact that aborigines of the foot-hills have little intercourse with the people of the main range and are therefore ignorant of the whereabouts of their settlements, my visit to the Kampar district was very ill-timed with regard to getting coolies for an expedition to the mountains, since the Sakai were engaged in making clearings for planting their padi. Repeated questionings of the Malays and Sakai gained me but little information about the people of the mountains, though

I chanced to hear reports of communal houses. Si Busu knew almost as little as the other Sakai from whom I made enquiries, but I arranged with him that he should go up country and try to bring down some wild people to see me. He left his house on May 5th, and calling in at a relation's clearing, a little further up the Kampar River, took this man with him, since he (Si Busu's relation) occasionally had dealings with the hill Sakai. On the afternoon of May 8th Si Busu and his relation returned, bringing with them twelve wild Sakai, three men, two boys, and seven women. All of them seemed very much frightened, the women keeping their eyes fixed on the ground, and the men being obviously extremely nervous. None of these people spoke Malay, though I believe that one of the men understood a few words of that language. On the day of their arrival I took a few photographs and some measurements of the men, and in the evening I got Si Busu to bring two of them to my tent. One kept his face averted the whole time and the other spoke in whispers when answering questions. I took a vocabulary (printed with this paper), of rather more than thirty words, but I did not attempt to carry the matter further owing to the Sakai's uneasiness. Judging from the words obtained, however, their dialect belongs to the central Sakai groups, as does that of the more civilized aborigines of the Kampar River. I did my best to find out from Si Busu where these people lived, what mountains their clearings were on, and what was the nearest river, but without much success, but probably they were from the Perak side of the main range. The next morning I was told that the women-folk being, I supposed, frightened, had departed at daylight. This was particularly annoying as some of them had tatu marks on the face, which I wanted to sketch. The men left at about 10 a.m. on the same day. I afterwards found out that Si Busu had got them down on false pretences, asking them, I believe, to help him in making his clearing. This, no doubt, partly accounted for their nervousness, since, when they found that I had called them, and that they had been told a lie, they probably thought that they were to be kidnapped. I reproached Si Busu for having told the Sakai an untruth, but he said that if they had known that a European wanted to see them they would have refused to come and would most likely have deserted their clearing. The only other information that I was able to gain about these people, partly from Si Busu, partly from themselves with Si Busu's assistance, was that their houses were small, but had several fire-places, and that one family occupied each house. Each household appears to possess two clearings, one planted with quick-growing crops such as *Sengkuai* (millet), Indian corn and gourds, the other with slow-growing vegetables such as tapioca, *keledak* (*convolvulus batanas?*) and caladium. When the quick-growing crops are exhausted they subsist on the produce of their second planting. I gathered that the Hill-Sakai only moved within a very small radius since they

said that they did not know the aborigines of the Kinta, Raia, Telom or any other rivers. They had never heard of the bow, nor did they know anything about the working of iron; so it would seem that they are not in touch with the Northern Sakai.

With regard to the tatu patterns mentioned above, except in one case where I have made a note that a man had a line tatued from the top of the forehead to the tip of the nose—only one man was tatued—I have to rely on my memory, owing to the Sakai women taking their departure as I have already related but, as far as I can recollect, the womens' patterns were very similar to those affected by the hill Sakai *men* of the Ulu Temengoh, i.e., three pairs of parallel lines running slantingly across each cheek and some V shaped markings on the forehead.

| <i>English.</i> | <i>Malay.</i> | <i>Sakai.</i> |
|-----------------|-------------------|--------------------|
| Head | ... Kepala | ... Jelbal. |
| Ear | ... Telinga | ... Entak. |
| Eye | ... Mata | ... Mat. |
| Nose | ... Hidong | ... Moh. |
| Cheek | ... Pipi | ... Ming. |
| Mouth | ... Mulut | ... Nynum. |
| Lips | ... Bibir | ... Nynum (?) |
| Tongue | ... Lidah | ... Lentag. |
| Tooth | ... Gigi | ... Lemoin. |
| Chin | ... Dagu | ... Lingkah. |
| Neck | ... Leher | ... Tangun. |
| Nape of neck | ... Tengkok | ... Tangkok. |
| Shoulder | ... Bahu | ... Gelpol. |
| Arm | ... Lengan | ... Kengris. |
| Elbow | ... Siku | ... Kanang. |
| Hand | ... Tangan | ... Tok. |
| Thumb | ... Ibu tangan | ... Jaras (?) tok. |
| Finger | ... Jari | ... Jaras tok. |
| Nail | ... Kuku | ... Chendros. |
| Thigh | ... Paha | ... Lempar. |
| Knee | ... Lutut | ... Kurul. |
| Shin-bone | ... Tulang kering | ... Jong kemaun. |
| Foot | ... Kaki | ... Juk. |
| Heel | ... Tumit | ... Chanong juk. |
| Sole of foot | ... Tapak kaki | ... Tapar juk. |
| Toes | ... Jari kaki | ... Jaras juk. |
| Breast | ... Dada | ... Entok. |
| Back | ... Belakang | ... Kenok. |
| Liver | ... Hati | ... Gris. |
| Stomach | ... Prut | ... Ek. |
| Navel | ... Pusat | ... Suk. |
| Intestines | ... Isi perut | ... Chong ek. |
| Blood | ... Darah | ... Behip. |
| Bone | ... Tulang | ... Je-ark. |
| Skin | ... Kulit | ... Getug. |
| Hair | ... Rambut | ... Sok. |

V. NOTE ON A COLLECTION OF ROCK,
SPECIMENS FROM PULAU PISANG, WEST COAST
OF JOHORE.

By J. B. SCRIVENOR, GEOLOGIST, F.M.S.

In May 1916 Mr. C. Boden Kloss sent me a collection of rock specimens from the small island, Pulau Pisang, off the southern part of the west coast of Johore. Mr. Kloss stated that only two of the specimens represent rock that he saw exposed *in situ* and that the remainder came from a shingle beach. All the specimens are from the north side of the island.

These specimens are of sufficient interest to warrant a note on them and their relations to other rocks in the Malay Peninsula. On glancing over the collection one had the impression that they were largely rocks of the "Chert Series" indurated by metamorphism, and thin sections prepared for the microscope support this view, while a pebble of granite in the collection shows how the metamorphism was effected, but on the other hand they show that volcanic ashes are also represented on the island. The following is a brief description of the rocks.

1. *Granite*. This pebble is too small to say what type of granite it was derived from. The slide contains only one mica, biotite, but a larger specimen might very likely show muscovite as well. There is nothing unusual about the rock.

2. *Quartz-mica-syenite-porphyry*. Nothing exactly corresponding to this rock has been found before in the Peninsula and it is unfortunate that it is only represented by a pebble. Hornblende is common and there is an equal quantity of altered biotite also in fairly large flakes. There are numerous porphyritic crystals of felspar full of finely divided decomposition products. Some of them appear to be kaolinized orthoclase but others show traces of polysthenic twinning. The felspar crystals are generally bordered by a very delicate growth which in some cases looks like a radial arrangement of minute fibres of felspar, but with a high power much of it is resolved into a micropegmatitic intergrowth of quartz and felspar. Quartz is confined to this intergrowth and to the base, which does not form a large proportion of the rock and is of felspar and quartz in small grains. The quartz is a minor constituent, and the rock is a porphyry of same composition as quartz-mica-syenite. The nearest approach to this rock known as yet in the Peninsula are certain syenitic rocks found in the Benom Range of Pahang (*vide* "The Geology and

Mining Industries of Ulu Pahang," p. 59, 60) which are believed to be of the same age as the granite of that range and possibly to owe their distinct composition to a mixture of a basic magma with that of the granite. Some of these rocks, however, contain pyroxene. There is none in the Pulau Pisang pebble nor is there any reason to believe that the hornblende is derived from pyroxene, and a rock of this nature might consolidate at a shallow depth from a part of a hornblende-granite magma poor in quartz. There is a quantity of white opaque matter showing a trace of crystal outline which is probably a decomposed titaniferous mineral.

3. This is a dark pebble, shown by the thin section to be altered volcanic ash rich in quartz and with orthoclase and soda-plagioclase as feldspars. Alteration is proved by the hard compact nature of the rock and the presence of a secondary mineral, in minute grains. It may be zoisite.

4. Another altered ash similar to 3. The secondary mineral is probably epidote.

5. A finer grained ash, full of a granular mineral, probably secondary epidote.

6. A rock with much secondary epidote which obscures its original nature. It may have been sandstone.

7. A pale grey pebble of very fine but hard texture. It is impossible to say anything with certainty about its mineral composition even after examination under a 1/12" oil immersion objective. It is probably altered shale with minute granules of epidote.

8. A pebble closely resembling black chert of the Chert Series, the resemblance being confirmed by the section. The secondary minerals are epidote, some forming minute veins, and a very finely fibrous mineral of which nothing definite can be said but which is probably an amphibole. There is no trace of radiolaria.

9. A banded pebble showing black and grey rock. Both are very fine grained but the black rock is certainly altered chert, while the grey is either shale or fine ash.

10. This is one of the two specimens mentioned by Mr. Kloss and is like No. 7. It shows stratification. Thin sections of the rock point to it being fine shale full of granular epidote.

11. The other specimen mentioned by Mr. Kloss consists of alternating bands of black and grey rock, the latter having a slight buff tint. The grey bands resemble 7 and 10 and may be either altered shale or fine ash. The black bands are altered chert and fine black shale. The secondary minerals they contain are epidote, the fibrous mineral seen in No. 8, which, in one slide, has a distinct greenish tint, and brown mica.

There can be no doubt that these rocks are from a junction of Chert Series rocks and granite and there are two points concerning them that are worth attention. The first of these is the association of volcanic ash.

The coarser specimens cannot be distinguished from some of the ashes of the Pahang Volcanic Series, and this is the third instance in which these volcanic rocks have been found associated with chert. Another instance is at Lubok Plang, on the Pahang River, where a bed of chert was found between a flow of lava and a layer of ash. Epidote occurs in the chert and in the volcanic rocks but in the Pulau Pisang chert it is more abundant. Radiolaria are more abundant in the Lubok Plang chert.

The second known instance of the association of volcanic ash and chert was afforded by specimens taken from a stone-heap in Singapore. The radiolaria in the chert are in some cases at any rate preserved as casts of chlorite and the same mineral occurs in the ash. Nothing definite could be learned about the locality whence these rocks came. One statement was to the effect that they might have come as ballast from Mauritius, but that is very unlikely, and in view of the nature of the Pulau Pisang rocks, they may have come from a neighbouring island.*

Generally the radiolarian cherts are found close to thick beds of quartzite and shale, and in the coarser quartzites pebbles of chert are abundant. Lately Mr. E. S. Willbourn has reported chert and quartzite to be interbedded in certain sections in Negri Sembilan. These three cases of association with igneous rocks suggest that in some cases their origin may be the same as that put forward in the *Geological Magazine* for 1911 (British Pillow Lavas and the rocks associated with them—loc. cit. pp. 202-209 and 241-248) by Messrs. Dewey and Flett, who think that silicate of soda from volcanic eruptions was dissolved in sea-water and created conditions favourable for siliceous protozoa such as radiolaria. As the eruptions that formed the Pahang Volcanic series were in part submarine, this may be a case of similar conditions and similar results.

The other point of interest is the resemblance of the pale grey rock (Nos. 7 & 10) to some of the boulders and pebbles found in Kinta with the boulders of tourmaline-corundum rock. These are light coloured, sometimes oolitic, and sometimes contain a little corundum and tourmaline. In a description† of the tourmaline-corundum rocks it was suggested that certain bodies in them may be replacements of casts of radiolaria, and a rock was found in Kinta actually showing

* A fourth occurrence of chert associated with an igneous rock is known on the Ginteng Sempah Road, Selangor.

† *Quart. Journ. Geol. Soc.* lxxi 1910, pp. 435-449.

radiolaria. The resemblance then, of the Pulau Pisang grey, fine-grained rock, to the light-coloured rocks forming part of "tourmaline-corundum rocks" and its association with chert, is further evidence for the tourmaline-corundum rocks being in part altered Chert Series rocks.

But, assuming this to be correct, there is a great difference between the alteration by granite on Pulau Pisang and by granite in Kinta. In the former case the very fine grain makes determination of constituent minerals difficult, but epidote, fibrous amphibole, and brown mica seem to be the result of metamorphism, while in the latter the alteration produced large quantities of tourmaline and corundum, with rutile, spinel, white mica, and fluorite.

VI. A NOTE ON CALLOSCIURUS FINLAYSONI (HORSF.) AND ALLIED FORMS.

By HERBERT C. ROBINSON, C.M.Z.S.

In recent articles on *Sciurus finlaysoni* in the "Journal of the Natural History Society of Siam" Mr. C. B. Kloss has dealt with this species and its allied forms at considerable length and has erected for races inhabiting Koh Si Chang and Kok Phai, islands in the Gulf of Siam, close to the mouth of the Menam River, two new races, viz. *Sciurus finlaysoni portus*, inhabiting the former, and *Sc. f. folletti*, the latter, island.

After discussing the literature in some detail Mr. Kloss has, after consideration, decided that the name *Sc. finlaysoni*, sensu stricto, shall be retained for the form inhabiting the mainland.

He attempts to justify his contention by referring to the original description by Horsfield (*Zool. Res. Java*—, 1824) in which that author states that "this species has hitherto been mentioned by Buffon alone from the following concise notice in P. Tachard's travels"—while, in addition, Mr. Kloss also refers to Anderson, who states that "the type of *Sc. finlaysoni* was obtained in Siam by Dr. Finlayson and another was procured by the same traveller in Sichang Island. These two squirrels are exactly alike, being white squirrels with a yellowish tinge." The latter clause shows that Dr. Anderson did not study these two specimens in any great detail.

Further, Mr. Kloss quotes Horsfield (*Cat. Mamm. E. Ind. Co. Mus.*, p. 154, 1851) as stating that the locality of the specimen in the Museum of the East India Company (transferred to the British Museum in 1879) was "Siam." This is, however, not strictly accurate. The habitat of the species is given as "Siam" while a specimen "A" is mentioned "from G. Finlayson's Collection during Crawford's Embassy to Siam and Hue," which is not quite the same thing.

The whole crux of the matter, however, is that the older authors paid no very particular attention, either to the exact localities of their specimens or to minute subspecific differences, and Koh Si Chang is certainly near enough to Siam to be quoted as such by Horsfield. The conception also, of a definite specimen as a type of a species when one or more were available is of very much later date than Horsfield in 1824 or for the matter of that than Dr. Anderson, writing in 1878.

We come, therefore, to the first detailed revision of the group on modern lines, that of Wroughton (*Ann. & Mag. Nat. Hist.* (8) ii, pp. 393 et seq., 1908). This paper has been

* Vol. i, pp. 157—162 (March 1915); op. cit. pp. 225—228 (December 1915); Vol. ii, pp. 16, 30 (June 1916).

quoted by Mr. Kloss but he has unfortunately omitted to note that therein the specimen from Koh Si Chang has been definitely selected as the type, as indeed had already been done by Bonhote in 1900. The dimensions given by Wroughton perfectly agree with those of the type of *Sc. f. portus*, Kloss, as is shown by the figures here repeated, those in parentheses being from the type of *Sc. f. portus*. Allowance must of course be made for the fact that the body measurements of the type of *Sc. finlaysoni* have presumably been taken on the dry skin.

Head and body, 175 (197); tail, 175 (183); hindfoot, 43 (44) mm. Skull: greatest length, 46 (46.5); interorbital breadth, 17.3 (16.7); zygomatic breadth, 28 (27.5); length of nasals, 13 (12.6) mm.

Under the rules governing nomenclature, as almost universally recognised by zoologists, the first reviser has the right to designate the type of a species from the original material, if such has not been done by the author of the species.

Sciurus finlaysoni portus therefore becomes a pure synonym of *Callosciurus finlaysoni finlaysoni* (Raffles).

The mainland animal being thus without a name I propose to dedicate it to the original discoverer.

CALLOSCIURUS FINLAYSONI TACHARDI, subsp. nov.

Diagnosis. Similar to the typical form from Koh Si Chang but considerably larger, greatest length of skull 53.5—57.0 mm. against 44.0—47.7 mm. in the typical form.

Type. Male adult (skin and skull) in British Museum from R. Mee Nan, Siam, altitude, 75 m. collected by Mr. T. H. Lyle on April 4th, 1900 (*sp. n.* f. sub. *Sciurus finlaysoni*, Bonhote, P.Z.S. (i) 1901, p. 53.)

Co-types. Krabin, Bangpakong R., Central Siam, collected by native collector in November, 1915. Nos. C.B.K. 2020, 2037—8, 2046—8). (cf. Kloss, Journ. Nat. Hist. Soc. Siam, ii, pp. 16, 30 (1916).

VII. THE NATURAL HISTORY OF KEDAH PEAK.

V. BOTANY.

By H. N. RIDLEY., M.A., C.M.G., F.R.S., F.L.S.

LATE DIRECTOR OF GARDENS, STRAITS SETTLEMENTS.

[A short account of the physiography of the mountain and a list of the Vertebrates obtained during the expedition has already been published in this journal (Vol. VI. pp. 219, 24-1). H.C.R.]

The Mountain of Kedah Peak, Gunong Jerai of the Malays, has been visited by several botanists, the first of whom appears to have been Thomas Lobb, who collected a few plants there which are now in the Kew Herbarium; later, Sir Hugh Low ascended it, accompanied by the well known orchid collector, Boxall. In 1893, I visited it myself and brought down a fairly extensive collection of the plants there. Some account of this trip was published in the Journal of the Royal Asiatic Society Straits branch, vol. 34, p. 23. Mohamed Aniff, of the Penang Gardens, has also been there,† and now we have an excellent collection made by Messrs. H. C. Robinson and C. B. Kloss in December, 1915. The specimens were gathered at a height of from 2,800 to 4,000 feet, and to these are added a few collected at Gurun at the foot of the Peak.

Among these are especially noticeable the additions of two new genera to the flora and both of these species new to science, viz. *Myrioneuron* (*Rubiaceae*) an Indo-Malayan genus, and *Eulalia*, a fine grass allied to Indian species. There are a number of other interesting species in the collection, noticeably the beautiful Jasmine *J. Kedahense*. A tall, white-flowered *Vaccinium* *V. eburneum*, another handsome new *Xyrist*, besides the *X. Ridleyi* formerly obtained by me here, and the very rare *Acriopsis Ridleyi*, of which the only specimen previously known was a single plant found in a pepper garden in Singapore.

The flora of Kedah Peak bears a considerable resemblance to that of Mt. Ophir, especially in the occurrence of lowland seashore plants at this altitude, isolated as they are from the ordinary habitats of these plants by the forests which lie between them and the sea. This is perhaps most marked in Mt. Ophir, but the occurrence here of such plants as *Archytea VahlII*, *Adinandra dumosa*, *Euthemis leucocarpa*, *Vaccinium Malaccense*, *Aneilema giganteum*, *Isachne rigida*, typically plants of open and usually sandy country distinctly suggest an original flora of a sandy, littoral character of which these

* Gardens Bulletin, Straits Settlements, I. No. 10, p. 353 (July 1916)
[A small list of Monocotyledons collected by Mohamid Haniff shortly before our visit to the Hill.]

† The *Xyridaceae* have unfortunately been omitted from Mr. Ridley's Manuscript but will be published in a subsequent number of this Journal.

littoral plants are the relics. There can be little doubt that Mt. Ophir was at one time an island detached from the mainland as Penang is to this day, and it seems highly probable that Kedah Peak may have been similarly isolated. The absence of any real Siamese element in the flora of Kedah Peak in spite of its practically over-looking the southern Siamese rice fields and heaths with their distinctive Siamese flora, has been noted by me previously, and this collection confirms it, although it includes the handsome *Bauhinia bracteata*, Grah., a plant of Siam which was obtained in the low country round Gurun. The flora of Kedah Peak is typically Malayan, and it is the most Northern Malayan mountain in the peninsula, unless the Gunong Perak range, quite unknown botanically as yet, should also contain a Malayan flora.

MAGNOIACEÆ.

I. TALAUMA LONGIFOLIA, *sp. nov.*

Talauma mutabilis, var. *longifolia*, Bl. Anon. p. 37.

A shrub 10 to 12 feet tall. Leaves thinly coriaceous, glabrous, lanceolate, long acuminate and shortly narrowed to the base, nerves 7 pairs, slender, reticulations conspicuous, 6 to 8 inches long, 1·7 to 2·5 inches wide, petiole ½ inch long. Peduncle 1·15 inch (in fruit) long, appressed, silky. Bud ellipsoid, beaked, appressed, silky. Petals glabrous, oblong, obtuse, cream or pale yellow, 7 inch long, 3 inch wide. Fruit glabrous, pustular 1·5 inch long, carpels about 6, beaked.

Kedah Peak at 3,900 feet alt. Flowers cream (no. 6040), small tree, flowers pale yellow, scented (no. 6110), also collected here by Mohamed Aniff, Moulmein (Lobb), Pungah (Curtis), Java. The narrower leaves and much smaller flower distinguish this from *T. mutabilis*, Bl.

1A. *Illicium Cambodianum*, Hance. At 3,900 feet (6002). Small tree, rosy cream flowers, at 3,000 feet (6089). Common in all mountain districts in the peninsula.

DILLENIACEÆ.

2. *Acrotrema costatum*, Jack. Flowers sulphur yellow, Gurun (6178), Kedah Peak (6067). Common in hill districts all over the peninsula.

ANONACEÆ.

3. *Goniotalamus subevenius*, King. Gurun (6174).
Distrib. Perak.

POLYGALACEÆ.

4. *Polygala venenosa*, Juss. At 3,800 feet. Common in the hill districts 6035.

5. *Salomonina cantoniensis* var. *gracilis*.

Stems slender, simple or little branched, slightly winged with small, nearly sessile ovate leaves above, longer petioled ones below. Fruit with short bristles along the edge.

This has the habit of *S. oblongifolia* but the leaves of *S. cantoniensis* reduced. This latter plant is usually a weed of cultivation and one would hardly expect to find it high upon Kedah Peak.

Flowers purplish at 3,000 feet. No. 6064.

TERNSTROEMACEÆ.

6. *Adinandra dumosa*, Jack. A variety with very rounded leaves at 3,000 feet. No. 5987. Common in the plains, but it also grows on Mount Ophir at 3,000 feet.

6A. *Eurya acuminata* var *glabra*, Bl. A form with rather larger flowers than the low country form. Small tree 15 to 20 feet, flowers whitish. Gurun No. 6172.

7. *Archytea VahlII*, Choisy. On dry ridges, yellowish white. No. 6083. Common in the low country and also on Mt. Ophir.

8. *Ternstroemia japonica*, Thunb. Trans. Lin. Soc. ii. 335.

Small shrub, leaves rather thinly coriaceous, lanceolate, long acuminate, subacute base gradually narrowed, nerves 5-6 pairs, rather conspicuous beneath for a *Ternstroemia*, 2-3.25 inches long, .7 to 1 inch wide, petiole .2 inches long. Calyx lobes ovate obtuse. Fruit globose .3 inches long on a slender pedicel .5 inches long. Seed ellipsoid .25 inches long, red.

Kedah Peak. Small shrub, seeds brilliant scarlet. No. 6039.

This resembles plants from Khasiya, Siam and Java. The leaves are thinner and more acuminate than in other eastern species. The specimens are all in fruit.

GUTTIFERÆ.

9. *Calophyllum Prainianum*, King? Kedah Peak No. 6039.

Only leaf specimens with reniform galls, but apparently this species.

10. *Garcinia eugenifolia*, Wall. At 3,000 feet. Distrib. Malaya.

STERCULIACEÆ.

11. *Buettneria Jackiana*, Wall. Gurun No. 6169. Flowers whitish. Distrib. Penang.

12. *Leptonychia glabra*, Turcz. Gurun No. 6153. Shrub about 10 feet. Common all over the Peninsula.

GERANIACEÆ.

13. *Impatiens Griffithii*, Hook. fil.

Kedah Peak 6007. Flowers rich, rose pink. Also collected there by Lobb and myself. It occurs too on Mt. Ophir.

OCHNACEÆ.

14. *Enthemis leucocarpa*, Jack. Kedah Peak at 3,000 feet from Padang upwards, No. 5967. Small shrub, flowers white, anthers pale yellow. This is usually a sea shore plant, but occurs also at the top of Mt. Ophir far from the sea as here.

15. *Gomphia Hookeri*, Planch. Tree about 20 feet tall. Flowers deep rose red at 3,000 feet. No 5989.

Also usually a sea coast plant.

ILICINEÆ.

16. *Ilex patens*, Ridl. var. *tenuifolia*.

Differs from the type in Gunong Tahan in its thinner, more polished leaves and more distinctly winged petiole. Petals 5 or 6.

Shrub, flowers white at 3,000 feet. No. 6105.

CELASTRINEÆ.

17. *Euonymus javanicus*, Bl. Padang to Sch. Small shrub. Capsule salmon pink. No. 5975.

Common all over our hill district.

LEGUMINOSÆ.

18. *Bauhinia bracteata*, Graham. Branches tomentose, reddish. Leaves glabrous, broadly ovate, bifid coriaceous, subcordate, lobes 2.5 inches long, nerves 10 nervules curved parallel, 3.5 m. long and as wide, petiole 2 inches. Panicle large 9 inches long, 7 inches across, branches tomentose. Pedicels 1.5-2 inches long, pubescent, with 2 linear bracts .15 nches long midway. Buds ellipsoid narrowing to tip. Sepals 2, ovate oblong, persistent pubescent, .3 inches long. Petals 5, claw slender pubescent .6 inches long, blade cordate, rounded, greenish white, conspicuously dark veined, edge crisp, back silky hairy, face sparsely hairy, .4 inches long and wide. Stamens 3, fertile .5 inches long, filaments hairy, anthers short, oblong, sterile ones 6 glabrous .4 inches long, filaments subulate gradually narrowed from base, anthers small, ovate. Pistil hairy at base.

Gurun. Flowers greenish white, very handsome. No. 6180. New to the Flora, a native of Siam.

RHIZOPHOREÆ.

19. *Anisophylleia trapexoidalis*, Baill. *A. disticha*, Baill. Gurun No. 6168. Shrub 7 to 8 feet.

Common in most parts of the peninsula.

20. *Pellacalyx saccardianus*, Scort. Gurun No. 6163. Small tree, flowers greenish.

Common in the low country.

HAMAMELIDEÆ.

21. *Rhodoleia Teysmanni*, Miq. At 3,000 feet. No. 5985. Small tree to 20 feet. Sepals yellowish, anthers rose pink.

On most of the mountain ranges of the peninsula.

MYRTACEÆ.

22. *Bækea frutescens*, Linn. From 3,000 to 6,000 feet. No. 6071. Habit very variable.

On all the high ranges.

23. *Leptospermum flavescens*, Sm. At 3,000 feet. No. 6082. Usually with the last.

24. *Tristania Merguinsis*, Griff. At 3,800 feet. No. 6034.

- 24A. *Eugenia claviflora*, Roxb. At 2,500 feet. No. 6019. Tall shrub. Flowers white.

25. *Eugenia subdecussata*, Duthie. At 3,000 feet. No. 6080. In fruit. Common in hill ranges.

MELASTOMACEÆ.

26. *Sonerila crecta*, Jack. At 3,000 feet No. 6063. *Distrib.* Penang—Perak.

27. *Sonerila linearis*, Hook. fil. Padang'to Seh upwards Nos. 5957. Flowers deep pink, anthers yellowish, leaves beneath purplish.

First collected here by Lobb., but overlooked by King, as the locality, Gunung Jerai, was referred to Burmah by error.

Endemic.

28. *Sonerila calophylla*, Ridl. Flowers pink. Stem and leaves very succulent. No. 6068.

Endemic to Kedah Peak. First collected by me.

29. *Phyllagathis rotundifolia*, Bl. Gurun. No. 6166. Flowers crimson.

30. *Medinilla Maingayi*, Clark. Epiphytic on Hydno-phytum. No. 6055.

Common in low country south of the Peninsula. Also on Mt. Ophir.

31. *Pternandra paniculata*, Benth. At 1,500 feet. No. 6148. Flowers whitish.

SAMYDACEÆ.

CASEARIA FLEXUOSA, *sp. nov.*

32. Branches flexuous with pale bark. Leaves glabrous, thinly coriaceous, lanceolate, narrowed at both ends, acuminate, acute, nerves 4 pairs, reticulations fine, distinct 3-3.5 inches long, 1-1.25 inches wide, petiole .2. Capitula dense, flowers about 20, rachis finally developing short and thick. Bracts numerous, lanceolate, acute ciliate. Flowers glabrous .1 inch

long, pedicels. Sepals oblong glabrous. Petals (inner pair) obovate orbicular, slightly broader, edge ciliate, stamens nearly as long as the sepals, glabrous, filaments thick, anthers broad obtuse. Staminodes as long as the stamens, oblong linear, villous at the tips, glabrous below. Pistil elongated conic, stigma capitate. Fruit ellipsoid .75 inches long, apricot coloured.

Kedah Peak (Ridley 5218, 5364), (Robinson & Kloss 6025). Penang (Curtis 1019).

BEGONIACEÆ.

33. *Begonia sinuata*, Wall. Flowers white. (No. 6005). Occurs also in Penang.

34. *BEGONIA SIBTHORPIOIDES*, *sp. nov.*

Rhizome tuberous .2 inches long, oblong, covered with golden hairs, stems very slender, 2-4 inches long, red, glabrous. Leaves in distant pairs, orbicular, cordate, crenulate, glabrous, nerves from base 6, .5 inches long and as wide, red beneath, petiole .2-.8 inch long. Stipules hardly .1 inch long, triangular lanceolate, ciliate. Male flowers 2-3 subterminal on slender erect branches 1 to 3. Bracts sheathing, lanceolate, acuminate. Sepals 2, oblong obtuse, narrowed towards the base. Petals 2, as long and wide, but subacute. All white. Anthers in a small globose head on a filament-pedicel as long. Fruit .1 inch long with one large oblong rounded wing .2 inches long, the other ones hardly developed. At 3,800 feet. No. 6047.

Flowers rose pink. Leaves red beneath. A very curious little plant with leaves like those of *Sibthorpia europea* in form.

ARALIACEÆ.

35. *ARTHROPHYLLUM OVATUM*, *sp. nov.*

A woody shrub. Leaves opposite paired, ovate to elliptic, base cuneate, rather long and sharply acuminate, edge thickened, coriaceous, nerves 3 to 5 pairs, sunk above, elevate beneath, 3.5 inches long, 1.75 inches wide, petiole 1.25-2 inches long. Umbels 2.5 inches long of 15 rays each, jointed half way, where is a caducous pair of small leaves. Flowers in umbellules of about 20. Pedicels .2 inches long. Buds subglobose, pointed. Calyx lobes short, rounded. Petals greenish yellow, triangular, lanceolate, acuminate .1 inch across. Stamens shorter.

No. 5995. Woody shrub 10 feet high, flowers greenish yellow. Also on Gunong Semangkok in Selangor (Ridley 15617).

36. *ARTHROPHYLLUM NITIDUM*, *sp. nov.*

Small shrub. Leaves 12 inches long, pinnate, leaflets 9-15 coriaceous, oblong or elliptic lanceolate, base often oblique 2.5 to 3.25 inches long, 1 inch wide, petiolule .25 to .4

inches long, terminal leaflet ovate acuminate, narrowed to the base, 2·5 inches long, 1·75 inches wide, petiole ·75 inches long polished above nerves, inconspicuous above, visible beneath, fine 3 to 4 pairs. Umbels 11 to 12, of 18 to 20 flowers, peduncle 1-1·25 inches long, pedicels ·2, umbels subtended by 1 to 3 phyllous leaves longer than them. Buds obovoid, blunt, Calyx lobes distant, blunt, rounded, short. Petals oblong, obtuse subtriangular. Stamens as long.

Small shrub (No. 6093).

37. *Dendropanax Maingayi*, King. At 3,000 feet. No. 6104. Shrub, flowers greenish.

At 3,900 feet. No. 6014. Shrub, flowers waxy-white.

Distrib. Mt. Ophir, Perak.

RUBIACEÆ.

38. *Ophiorrhiza tomentosa*, Jack. Kedah Peak (No. 6037).

Distrib. Penang, Perak.

Oldenlandia diffusa, Roxb. By sides of streams. Kedah Peak. Flowers white. No. 6147.

Distrib. Trop. Asia.

39. *Hedyotis capitellata*, Wall. Gurun. Creeper, flowers greenish-white. No. 6175.

Common all over the peninsula.

40. *Hedyotis pedunculata*, King, Kedah Peak. At 3,000 feet. Flowers lilac.

Endemic.

41. *Hedyotis flexuosa*, Ridl. Kedah Peak. (5988). Also Mt. Ophir and Batu Pahat.

42. *Hedyotis macrophylla*, Wall. Gurun. Flowers white. No. 6177.

Distrib. Malacca, Penang.

43. MYRIONEURON MICROCEPHALUM, *sp. nov.*

A shrub, branches slender, pale coloured. Leaves lanceolate, membranous, long acuminate, narrowed to the base, nerves 6 pairs, inarching within the margin, 4 inches long, 1-7 inches wide, ·2 inches long. Stipules ·1 inch long, tubular, with two broad acute points and two subulate bristles. Inflorescence terminal of 2-3 short branches, peduncle less than ·1 to ·2 inches long. Flowers few 3-4, subsessile. Bracts lanceolate as long as the flower, acuminate. Ovary obconic with wavy ridges. Calyx-lobes 5 linear, acuminate. Corolla hardly longer, tube very short, cylindric lobes much longer, linear acuminate, ·2 inches long.

Gurun. No. 6180a.

The genus *Myrioneuron* occurs in India and Borneo, but this is the first species recorded from the Malay Peninsula.

December, 1916.

It is very distinct from the other species, which have large heads of flowers in its only having 3 or 4 quite small ones on a short peduncle. There is no fruit on any of the specimens and only a few flowers and some buds. The stamens and style in the two I could examine were destroyed by some hymenopterous insect.

44. *Argostemma unifolium*, Benn. Kedah Peak, on rocks at 3,000 feet. Flowers white. No. 6116.

Distrib. Penang.

45. *Urophyllum streptopodium*, Wall. Gurun. Mixed with *Myrioneuron* No. 6180a.

Common whole Peninsula.

46. *Pavetta indica* var. *polyantha*. Kedah Peak at 3,500 feet. No. 6119.

Common all over the Peninsula.

47. *Ixora Brunonis*, Wall. Gurun. Flowers white, slightly scented. No. 6176.

Distrib. Penang, Perak, also Burmah.

48. *Ixora stricta*, Roxb. Gurun. Six feet tall. Flowers salmon pink. No. 6161.

Distrib. Indo-Malaya.

49. *Ixora congesta*, Roxb. Kedah Peak at 1,500 feet. Ten feet tall, orange red. No. 6150.

Distrib. Burmah, Malaya.

50. *Ixora arguta*, Br. Gurun. Shrub, flowers white. No. 6141.

Distrib. Whole Peninsula.

51. *Canthium didymum*, Gaertn. Kedah Peak 2,500 to 3,200 feet. Shrub, flowers greenish 6132.

Common all over the Peninsula.

52. *Randia macrophylla*, Benth. Gurun 6179, 6157. Whole Peninsula and Sumatra.

53. *Hydnophytum formicarium*, Jack. Kedah Peak at 3,000 feet. No. 6054, 6076.

Whole Peninsula.

54. *Psychotria polycarpa*, Hook, fil. var. Kedah Peak. Creeper, fruit white. No. 6032.

This is the stiff leaved form which also occurs on Mt. Ophir.

55. *Lasianthus cyanocarpus*, Jack. Kedah Peak at 1,500 feet. Shrub, flowers white, fruit turquoise. No. 6143.

Distrib. Indo Malaya.

56. *Lasianthus appressus*, Hook fil. Gurun. Herb, flowers white, fruit black. No. 6154.

Distrib. Whole Peninsula.

57. *Lasianthus Wrayi*, King. Small shrub, fruits purplish. Kedah Peak 6065.

Distrib. Perak.

58. *Chasalia curviflora*, Thw. Gurun. 6158, 6159.

Common all over the Malay Peninsula. var *angustifolia*.

Kedah Peak at 3,000 feet. No. 6051.

59. *Saprosma pubescens*, Ridl. Gurun. Shrub 7 feet tall. Also on Mt. Ophir.

60. *Cephaelis Griffithi*, Hook. fil. No ticket.

61. *Cephaelis Ridleyi*, King. Kedah Peak 2,500 to 3,000 feet. Shrub, flowers waxy-white.

COMPOSITÆ.

62. *Gynura samentosa*, DeC. Kedah Peak at 3,996 feet. No. 6044.

Distrib. Whole Peninsula.

63. *Erechthites valerianifolia*, DeC. *Gynura rosea* Ridl. *Gynura bicolor* King, not DeC.

Kedah Peak beneath the Trig. station, no doubt brought by coolies. Flowers pink. No. 6038.

A South American weed spreading all over the old-world tropics.

VACCINIACEÆ.

64. *VACCINIUM EBURNEUM* *sp. nov.*

Tree up to 20 feet tall, much branched. Leaves thickly coriaceous, elliptic ovate, narrowed equally to both ends, apex acute, base cuneate, nerves ascending 3-4 pairs slender, 1-5 to 2 inches long, .5 to .8 inches wide. Petiole .1 inch long. Raceme 1-5 inch long, flowers waxy white, pendulous on one side .25 inch long; pedicels .15 inch long. Calyx lobes ovate, subacute or rounded edges ciliate. Corolla cylindric, lobes short, ovate, recurved, glabrous. Stamens short, about half the length of the corolla, filaments hairy; anthers oblong, connective, prolonged oblong crenulate, cell-spurs subulate. Style stout pubescent, longer than the corolla, ovary half inferior. Kedah Peak at 3,000 feet. No. 5986.

Allied to *V. Kunstleri*, King & Gamble.

65. *Vaccinium malaccense*, Wight. Kedah Peak. Also collected here by Lobb.

All over the Peninsula, but local.

ERICACEÆ.

66. *Rhododendron jasminiflorum* Hook. Kedah Peak at 3,000 feet. Flowers white, flushed pink. No. 6057. Flowers white, Shrub. No. 6030.

Mt. Ophir and Perak Hills.

67. *Rhododendron Teysmanni* Miq. Small shrub, flowers apricot yellow.

Kedah Peak. No. 5966.

68. *Rhododendron leucobotrys* Ridl. A tall shrub, flowers white. No. 6033.

Endemic on Kedah Peak.

69. *Rhododendron longiflorum* Lindl. Kedah Peak from 3,800 feet upwards. Flowers "Rose dorée." No. 5967.

EPACRIDÆ.

70. *Leucopogon Malayana* Jack. var. *moluccana*.

Kedah Peak at 3,000 feet. No. 5983.

Distrib. of variety Tenasserim collected on Kedah Peak by Low.

MYRSINÆ.

71. *Myrsine Porteriana* Wall. Kedah Peak 3,500 feet. Small shrub, flowers white 6075. *Distrib.* Penang, Pahang, Selangor or Perak and Mt. Ophir.

72. *Labisia pumila* Benth. var. *lanceolata*. Kedah Peak 2,500 to 3,000 feet alt. No. 6125.

Common all over the Peninsula, Sumatra, and Borneo.

73. *Ardisia colorata* Roxb. var. *salicifolia* King. Kedah Peak. Small tree 20-25 feet tall, flowers pink at 3,000 feet. No. 6094.

Distrib. of variety, Perak and Malacca.

74. *Ardisia crenata* Roxb. No specific locality. *Distrib.* Burmah to China and Japan. Common.

GENTIANACEÆ.

75. *Canscora andrographioides*, Griff.

A slender herb over a foot tall, stems 4 angled. Leaves lanceolate, acuminate, acute, narrowed at the base, 3-nerved, 2 inches long, .3 inches wide, lower ones 1.5 inches long, .4 inches wide. Flowers solitary, axillary on pedicels 1 inch long with 2 pairs of small leaves. Calyx .5 inches long, cylindric, narrow, not winged, lobes narrow acuminate. Corolla white .4 inches across, lobes narrow.

Kedah Peak at 3,000 feet. No. 6072.

An addition to our flora. A native of India and Burmah.

OLEACEÆ.

76. *JASMINUM KEDAHENSE* sp. nov.

Jasminum Maingayi var. *Kedahense* King & Gamble.

Climber; branches rather stout, pubescent. Leaves stiffly coriaceous, ovate, base rounded, apex acuminate, blunt, nerves 4 pairs sunk above, elevate beneath, above glabrous, beneath the

nerves and often whole surface of the leaf pubescent, 3 inches long, 2 inches wide, petiole ½ inches long, pubescent. Flowers about 14 crowded in a terminal head, peduncle and pedicels ½ inches long or less, pubescent. Calyx tube obconic, lobes narrow, linear, acuminate, hairy, ½ inches long. Corolla glabrous, tube 1½ inches long, ½ inches wide.

Kedah Peak at 3,000 feet, Padang, to Seh. No. 5981, 6077. This beautiful Jasmine was first collected by me in fruit only on Kedah Peak. The specimens however were too incomplete for description and Dr. King and Mr. Gamble made it a variety of *J. Maingayi*, Clark, suggesting that it might be a distinct species. The excellent specimens above described show that it is quite distinct.

STYRACEÆ.

77. *Symplocos prunifolia*, Ridl. Shrub, flowers white. Kedah Peak 6096.

Distrib. Gunong Tahan and other mountains.

APOCYNACEÆ.

78. *Alyxia pilosa*, Miq. Creeper or semiscandent shrub, flowers white. Kedah Peak at 3,000 feet. No. 6092.

Also in Perak, Bujang, Malacca and on Mt. Ophir, and in Sumatra and Borneo.

79. *Ervatamia Malaccensis*, King & Gamble. Gurun No. 6171. Shrub 10 feet, capsules chrome yellow.

Distrib. Whole Peninsula.

ASCLEPIADEÆ.

80. *Dischidia bengalensis*, Colebr. No special locality.

Distrib. India, whole Peninsula, Java, Borneo.

LOGANIACEÆ.

81. *Gaertnera oxyphylla*, Benth. *Gaertnera Koenigii* var *oxyphylla* Clark. Leggy shrub, flowers white, Kedah Peak 2,500 to 3,000 feet alt. No. 6013.

The latter a narrow stiff-leaved form.

This plant has long been mixed with the *Gaertnera Koenigii*, Wight, of Ceylon, as a variety, but it seems to me clearly distinct.

CONVOLVULACEÆ.

82. *LETTISOMIA ARGENTEA*, *sp. nov.*

Shrubby climber, stems ½ inches through, woody shortly, silky hairy. Leaves lanceolate, acuminate, blunt, the mid-rib running out into a small mucro, base narrowed, blunt, subcoriaceous, silky on both sides but densely so on the back, nerves sunk above, elevate beneath about 10 pairs, ⅓ inches long, 1 inch across, petiole ⅓ inches.

Cymes lax, silky, 3-4 flowered, peduncle .5 inches long, pedicels as long. Sepals ovate rounded, sub-equal, stiff, .4 inches long, silky outside, glabrous within. Corolla and stamens not seen. Style .3 inches long, filiform. Berry globose, covered with thick red pulp, 2 celled.

Kedah Peak 2,500 feet to 3,000 feet. A very beautiful plant, silvery silky all over.

SCROPHULARINEÆ.

83. *Torrenia peduncularis*, Benth. Kedah Peak at 1,500 feet. No. 6145. Herb, flowers purplish violet.

Distrib. Malaya.

UTRICULARIACEÆ.

84. *Utricularia involvens*, Ridl. Kedah Peak at 3,000 feet. No. 5959. The only known locality.

85. *Utricularia ophirensis*, Ridl. Kedah Peak No. 6112. Flowers purple.

86. *Utricularia striatula*, Sm. *Utricularia orbiculata*, Wall. At 3,000 feet. No. 5976, on rocks among moss, general color of plant pale violet.

87. *Utricularia nigricaulis*, Ridl. Among moss in stream, flowers pale violet. No. 5956.

Distrib. Pahang.

GESNERACEÆ.

88. *Aeschynanthus Lobbiana*, Hook. Kedah Peak 3,000 feet. No. 5997, No. 6049.

Distrib. Malaya.

89. *Didymocarpus citrina*, Ridl. Kedah Peak at 3,000 feet. No. 6004. Endemic.

90. *Didymocarpus sulfurea*, Ridl. Kedah Peak, on rocks, flowers yellow. No. 6052.

Distrib. Sclangor and Perak.

91. *Boca elegans*, Ridl. Kedah Peak, on rocks below beacon. Leaves silvery. No. 6062.

Only known locality.

ACANTHACEÆ.

92. *Pseuderanthemum porphyranthos*, Clarke. Kedah Peak, small shrub, flowers lilac. No. 6149.

Distrib. Whole Peninsula.

VERBENACEÆ.

93. *Clerodendron deflexum*, Wall. Kedah Peak at 3,500 feet. 6117. Common all over the Peninsula.

LABIATÆ.

94. *Scutellaria discolor*, Colebr. Kedah Peak at 3,800 feet. No. 6036. Flowers purplish.

Distrib. Indo-Malaya, not common in the Peninsula.

95. *Gomphostemma oblongum*, Wall. Kedah Peak at 1,500 feet. No. 6144. Small shrub, fruit white.

APETALÆ.

PIPERACEÆ.

96. *Piper penangense*, C. de C. Kedah Peak at 3,500 feet. No. 6115; also occurs in Penang.

NEPENTHACEÆ

97. *Nepenthes gracilis*, Korth. Kedah Peak, Padang To Seh. 3,000 feet, 5969.

98. *Nepenthes ampullaria*, Jack. At 3,000 feet. No. 6050.

BALANOPHORACEÆ.

99. *Rhopalocnemis rupeps*, Ridl. Rich strawberry red, root stock yellowish. No. 6107.

Distrib. Perak, Penang.

LORANTHACEÆ.

100. *Korthalsella japonica*, Engl. On *Alyxia* and other shrubs. No. 6079. Also collected by me here and on Mt. Ophir.

Distrib. India, China, Japan, Australia.

101. *Loranthus ferrugineus*, Roxb. At 2,800 to 3,000 feet. No. 6131.

Common in the Peninsula.

102. *Elytranthus avenis*, Don. At 3,000 feet. No. 5980. Also collected here by Lobb and myself.

Distrib. Java, Sumatra.

PROTEACEÆ.

103. *Helicia attenuata*, Bl. At 3,500 feet. Tall shrub flowers greenish. No. 6118.

Distrib. Whole Peninsula and Java.

THYMELEACEÆ.

104. *Wikstroemia Candolleana*, Meissn. At 2,800 to 3,000 feet. Small shrub, flowers yellow.

Distrib. Gunong Tahan and other mountains of the Peninsula.

SANTALACEÆ.

105. *Henslowia varians*, Bl. A climber, rather slender. Leaves oblanceolate or obovate, obtuse, rounded, narrowed at the base, nerves 5, conspicuous on both sides when dry, 1.75 to 2 inches long, .5 to 1 inch wide, petiole .5 inches long. Flowers yellowish, solitary or 2-4 axillary on very short peduncles with one or more ovate bracts. Perianth tubular .1 inch long, lobes ovate acute. Fruit very small, red, 1 inch through, globose or oblong-globose with 5 longitudinal grooves, and transverse ones, making it nodulose.

At 3,000 feet; flowers yellowish. No. 6088.

Distrib. Java.

This is not the plant described in the Materials by Gamble as *H. varians* Bl., which appears to me to be certainly *H. umbellata* Bl. and has shorter tubed flowers, many in an axil, on longer pedicels and a considerably larger fruit. *H. varians* Bl., very well figured in Mus. Bot. I. pl. xliii. has a very small fruit resembling that of *H. buxifolia* Bl. This latter species however is more of an erect shrub with round leaves and is entirely yellow in leaf and stem; usually found in low ground near the sea. It is quite possible that some of the specimens quoted as *H. buxifolia* Bl., from mountain districts, are *H. varians* Bl.

Henslowia Ridleyi, Gamble. In the account of the flora of Gunong Tahan published in the Journal of the Federated Malay States Museum, Vol. vi., p 170, I described a plant to which I had originally given the name of *H. minor*, but the account of this genus by Gamble being published before this paper was printed I thought that *H. minor* was the plant intended for *H. Ridleyi* by Gamble, as he had given Gunong Tahan as a locality. I therefore gave the description as that of *H. Ridleyi*. I have since found out that the plant intended as *H. Ridleyi* by Gamble is quite a different species, though it occurs in the same localities. The name *Henslowia minor* therefore I restore for the species described as above under the name *H. Ridleyi*.

LAURINEÆ.

106. *NOTHOPHOEBE ANGUSTIFOLIA*, *sp. nov.*

Shrub 4 feet tall. Leaves alternate, coriaceous, lanceolate, acuminate, narrowed at the base, nerves about 10 pairs, very inconspicuous, 3.5 inches long, 1 inch wide, petiole 2.5 inches long. Panicle 1.5 inches long, .5 inches wide, about .5 inches across, sparsely pubescent, pedicels nearly .1 inch long, silky. Flowers dirty yellowish-green, .1 inch long. Buds oblong blunt. Perianth segments subequal, ovate, oblong, obtuse, pubescent, inner row slightly smaller, connate shortly at the base. Stamens, outer row 3 with hairy slender filaments, anthers 4-celled, introrse, second row similar, third row introrse, glands oblong, flat, glabrous. Staminodes

villous. Ovary obovoid, narrowed at the base. Style filiform, rather stout, stigma capitate. At 3,800 feet. No. 5996. Shrub 4 feet tall, flowers dirty yellowish-green.

This is possibly a *Machilus*, of which it has more the habit, but I have seen no fruit.

EUPHORBIACEÆ.

107. *Phyllanthus frondosus*, Wall. Small shrub, flowers pinkish, 3,000 feet. No. 6103.

Common in the hill forests.

108. *Sauropus forcipatus*, Hook. fil. At 1,500 feet. No. 6146. Shrub, flowers yellowish.

Distrib. Malay Peninsula.

109. *Coelodiscus montanus*, Muell. Arg. Gurun. No. 6173. Small shrub 4-5 feet.

Distrib. Malay Peninsula.

Mallotus porteriannus, Muell. Arg. 2,800 to 3,200 feet. No. 6129. Small shrub, fruit prickly.

110. *Galearia Lindleyana*, Muell. Arg. Gurun. No. 6170. Large under-shrub 10-15 feet tall.

Distrib. Malaya.

111. *Agrostistachys filipendula*, Muell. Arg. Tall shrub, flowers yellow. 2,500 to 3,000 feet. No. 6017.

Exeocaria quadrangularis, Muell. Arg. Kedah Peak. No. 6126. Hills of the peninsula.

CONIFERÆ.

112. *Dacrydium elatum*, Br. At 3,000 feet. Tree up to 40 feet tall. No. 6053.

Distrib. Tenasserim and mountains of the Malay Peninsula.

113. *Agathis loranthifolia*, Salisb. At 3,000 feet. No. 6106.

Distrib. Penang and Perak hills.

GNETACEÆ.

114. *Gnetum campestre*, Gamble mss. *G. microcarpum* var. *campestre*, Ridl. At 3,000 feet. Padang To Seh. No. 5972.

ORCHIDÆ.

115. *Liparis Maingayi*, Ridl. Damp rocks at 3,500 feet. No. 6121.

116. *Dendrobium revolutum*, Lindl. At 3,000 feet. On trees. Flowers white, upper wings of lip brownish, lower more yellowish. No. 5951.

Distrib. From Tenasserim to Rhio.

117. *Dendrobium villosulum*, Wall. At 3,000 feet. Flowers creamy yellow. Sepals faintly striped darker. No. 6113. Lip pale orange. Petals and sepals pale cream, lined with brown. No. 6137.

118. *Dendrobium hymenopterum*, Hook. fil. At 3,000 feet. Flowers pale lilac, sides of column orange. Nos. 5952, 5953.

Distrib. Pahang, Perak and Lankawi.

119. *Desmotrichum Kelsalli*, Ridl. Kedah Peak. Flowers reddish brown. No. 6031.

Distrib. Pahang, Malacca, Perak.

120. *Bulbophyllum longiflorum*, Ridl. At 3,500 feet. Flowers white, petals and sepals with regular lines of magenta. Lip and column orange. No. 6084.

121. *Bulbophyllum concinnum*, Hook. fil. No. 6087. Epiphyte. Flowers pale yellow.

Distrib. Malay Peninsula, and Borneo.

122. *Bulbophyllum Selangorensis*, Ridl. Flowers yellow, lip apricot. No. 6028.

Distrib. Selangor Mountains.

123. *Eria lorifolia*, Ridl. On dead logs at 3,000 feet. No. 6061. Endemic.

124. *Eria floribunda*, Lindl. 6059. In fruit only.

Common in the Peninsula and Borneo.

125. *Eria teretifolia*, Griff. Flowers pale lemon, base of column pale yellow, edged magenta, lip reddish distally. No. 5978.

Common in the hills of the Malay Peninsula and Borneo.

126. *ERIA DILUTA* *sp. nov.*

Rhizome apparently long, creeping, stems erect, remote, 4 inches long, slender, covered with lanceolate, acute brown sheaths, 4 inches long. Leaves narrow, linear, acuminate, acute, base narrowed, 3.75 inches long, 4 inches wide. Raceme subterminal 5 inches long, covered with brown, lanceolate acuminate bracts 2-flowered. Pedicel 4 inches pubescent. Sepals 3 inches long, lanceolate, acute, yellowish-white, laterals nearly 2 inches wide. Mentum short and broad. Petals linear, acute, as long as sepals but much narrower. Lip trifid, as long as sepal, lateral lobes falcate, broad, midlobe oblong, subacute, dilate towards the tip, at the base two short ridges meeting in a V, fleshy, thick, 2 short undulate ridges along the lobe bases, one median running to tip elevate into a prominent keel, undulate. Column long, curved, margin entire, highly elevate, filament rather long. Anther phrygian-cap-shaped and blunt. At 3,000 feet. Flowers yellowish white. Lip and column tinged brownish-pink. No. 5980.

Apparently allied to *Eria nutans*, Lindl. and *Eria ramulosa*, Ridl.

127. *Eria xanthocheila*, Ridl. At 3,500 feet. Sepals whitish-green, faintly veined with reddish. Lip yellow. No. 6120.

Distrib. Malay peninsula.

128. *Eria tenuiflora*, Ridl. At 3,000 feet. No. 6074.

Distrib. Malay peninsula and Borneo.

129. *Ceratostylis gracilis*, Bl. At 3,800 feet. Flowers yellowish, lip pale red. No. 6006.

Distrib. Malay peninsula and islands.

130. *Trichotosia poculata*, Ridl. Kedah Peak. No. 5999. Also in Perak and Mt. Ophir.

131. *Trichotosia aporina*, Hook. fil. Flowers campanulate, white. At 3,000 feet. No. 5965.

Distrib. Malay peninsula.

132. *Plocoglottis javanica*, Bl. At 1,500 feet. Flowers crimson and yellow. No. 6140.

Distrib. Malay peninsula, Java.

133. *Spathoglottis aurea*, Lindl. The true, deep coloured form (*Spathoglottis Wrayi*) leaves often reddish beneath. No. 5992.

Distrib. Malay and Borneo mountains.

134. *Calanthe angustifolia*, Lindl. At 3,500 feet. Flowers white, ridges to base of lip faintly yellow. No. 5993. Mountains of Malay peninsula.

135. *Calanthe* (Limatodes) *gracilis*, Lindl. Stem 3 inches or more. Leaves lanceolate, acuminate plicate, narrowed towards the base, 9 inches long, 1.25 inches wide. Scape slender from the stem below the leaves. 20 inches long, puberulous. Flowers about 15 remote, pedicels 3 inches long. Sepals lanceolate, acuminate, narrow, pubescent outside 4 inches long. Petals linear, lanceolate, acuminate glabrous. Lip spurless, 3 lobed, side lobes long, lanceolate, acute, midlobe fleshy at base, longer, 3 inches long, oblong with a small orbicular, undulate, crenulate, bilobed lamina, claw of midlobe channelled with thick fleshy ridges, and a hairy mass at the base. Column short, thick and free from the lip. At 3,000 feet. Flowers white, sides of lip yellow. No. 5998. *Distrib.* North India, Siam and China. A good addition to our Flora.

136. *Arundina Philippii* var. *Malayana*, Ridl. At 3,000 feet. Tip of lip pale pink, throat yellow. No. 5982. Found here by me also.

137. *Coelogyne perakensis*, Rolfe. At 3,000 feet. Flowers apricot yellow, throat rich chrome. No. 6060. *Distrib.* Perak Hills. Pahang.

138. *Coelogyne pallens*, Ridl. Flowers delicate, greenish-white, edges of lip fringed. At 3,000 feet. No. 6085. Also collected here by Mohammed Aniff. *Distrib.* Perak Hills.

139. *Bromheadia palustris*, Lindl. At 3,000 feet. No. 6073.

140. *Agrostophyllum callosum*, Bl. 2,500 to 3,000 feet. Flowers pale cream. No. 6133.

141. *Acriopsis Ridleyi*, Hook. fil. At 3,000 feet. Padang To Seh. Flowers yellow, spotted with purple, column pinkish. Nos. 5973, 5974.

This is an unexpected discovery. The species was only known hitherto from a single specimen obtained by me on a pepper stump in Singapore, no doubt found by a Chinaman in felling the forest and put to grow on the stake. No other specimen has been seen till in the present collection comes a fine series from the other end of the peninsula.

142. *Oxyanthera elata*, Hook. fil. 2,500 to 3,000 feet. No. 6018.

Distrib. Whole peninsula, Java, Sumatra and Borneo.

143. *Podochilus muricatus*, Schl. At 3,000 feet. Flowers white, hairy, throat purple. No. 5990.

144. *Podochilus cornuta*, Schlecht. Kedah Peak, no special locality. No. 6090.

145. *Podochilus sciuroides*, Reichb. At 3,000 feet. No. 5952.

146. *Tropidia squamata*, Bl. Flowers white, with a slight greenish cast. No. 6012.

Distrib. Malay Peninsula and Borneo.

147. *Anoetochilus Reinwardtii*, Bl. Flowers white, stem reddish. 3,000 feet. No. 5977.

Also occurs in the Perak Hills, Java and Sumatra.

APOSTASIACEÆ.

148. *Apostasia nuda*, R. Br. Without locality.

Distrib. Whole peninsula.

SCITAMINEÆ.

149. *Costus speciosus*, var. *argyrophyllus*. At 2,800 to 3,200 feet. No. 6128.

Common all over the peninsula.

150. *Globba panicoides*, Miq. At 3,000 feet. No. 6070.

Distrib. Whole peninsula and Sumatra.

151. *Hedychium collinum*, Ridl. Flowers white, heavily scented at 4,000 feet. No. 6027.

The original locality for this species.

BURMANNIACEÆ.

152. *Burmattia disticha*, L. At 3,000 feet. Padang To Seh. Flowers usually large, with many heads, pale blue. No. 5961.

Distrib. Indo-Malaya, China, Australia.

LILIACEÆ.

153. *Protolirion paradoxum*, Ridl. and Groom. On dead leaves at 3,800 feet. No. 6000.

Distrib. All over the Malay Peninsula at high altitudes.

154. *Dianella ensifolia*, Red. 3-4,000 feet. Nos. 5994, 6001.

155. *Dracaena terniflora*, Roxb. About 3 feet tall. Gurun. No. 6165.

156. *Smilax calophylla*, Wall. Kedah Peak, 3,500 feet. No. 6135.

Distrib. Whole peninsula.

157. *Smilax laevis*, Wall. Climber, flowers greenish yellow, at 3,000 feet. No. 6066.

Distrib. Malay Peninsula, China.

FLAGELLARIACEÆ.

158. *Susum malayanum*, Hook fil. Kedah Peak. No. 6,011. Unripe fruit, whitish.

Distrib. Malay peninsula.

PALMAE.

159. *Licuala Scortechinii*, Becc. Short stemmed palm 2,500 to 3,000 feet. No. 6016.

Distrib. Malay Peninsula.

160. *Pinanga disticha*, Bl. Gurun. No. 6152.

Distrib. Malay Peninsula and Borneo.

161. *Iguanura Wallichiana*, Hook. fil. Gurun. No. 6151. Small palm stem about 4 feet, flowers white.

Distrib. Malay Peninsula.

162. *Calamus ramosissimus*, Griff. At 2,500 to 3,000 feet. Inflorescence greenish white. No. 6015.

Distrib. Malay Peninsula.

PANDANACEÆ.

163. *Pandanus collinus*, Ridl. Kedah Peak. No. 6127.

Distrib. Mountains of Malay Peninsula.

CYPERACEÆ.

164. *Mariscus Sieberianus*, Nees. Kedah Peak 3,000 to 3,500 feet. No. 6046.

Unusually high for this common lowland plant.

165. *Actinoschænus filiformis*, Benth. At 3,000 feet. No. 6109.

Distrib. Malay Peninsula, China.

166. *Hypolytrum latifolium*, Rich. At 1,000 feet. No. 6142.

167. *Gahnia javanica*, Moritz. At 3,000 feet. No. 5970.

Distrib. All high mountains in the Malay Peninsula and Java.

168. *Gahnia tristis*, Nees. Padang 'To Seh 3,000 feet. No. 5964.

Usually a sea shore plant, but it also occurs on Mt. Ophir.

169. *Scleria multifoliata*, Bæck. At 3,000 feet. No. 6108.

Usually a hill plant but it does occur in the low country.

170. *Carex indica*, L. At 3,000 feet. No. 6136.

Scattered over the peninsula, India and Malay peninsula.

GRAMINEÆ.

171. *Isachne rigida*, Nees. A stiff, erect grass 18 inches tall, leaves stiff, lanceolate, acuminate, acute, coriaceous, glabrous, strongly ribbed, edge denticulate, base cordate 5 inches long, 2 inches wide, sheath smooth or occasionally armed with stiff cilia rising from pustules. Panicle 1 inch long, 7 inches across, spreading, lax, stiff. Outer glumes round pubescent.

At 3,000 feet. No. 6111. Rare in the peninsula. Only collected in our area at Setul. It occurs often in sandy spots on heaths and dry spots on mountains in Borneo and Java.

Ischæmum Fieldingianum, Rendle. At 3,000 feet. Padang 'To Seh in open spaces. No. 5958.

Also Mt. Ophir.

172. EULALIA LANIFES, sp. nov.

Base of stem and sheaths densely white, woolly. Leaves flaccid, 20 inches long, 2 inches wide, linear, gradually acuminate, bases white-hairy, ligule white-silky hairy. Culms rather slender, terete glabrous except at the top, 20 inches long. Spikes 3-8, six inches long, densely white, hairy. Flowers in pairs, one sessile and one stalked, similar pedicel and outer glumes covered with long white hairs. Glume I and II lanceolate, acuminate, narrow, thin, hairy on the back with long soft hairs. III lanceolate, acuminate, very narrow, sparsely hairy. IV narrow, lanceolate, acuminate. Awn 7 inches long, base dark brown, spirally twisted, apex pale scabrid. Styles purple, short plumed. Caryopsis oblong, ellipsoid, narrowed at base, beaked with the remains of the style, light brown, smooth. At 4,000 feet. No. 6036.

A beautiful grass allied to *E. argentea*, Brngn. Voy. Coq. Bot. p. 92, but with much larger spikes and flowers and long acuminate narrow glumes, and the base of stems woolly.

173. *Oxytenanthera sinuata*, Gamble. At 3,000 feet. No. 6069.

Rather a rare or rarely collected Bamboo. Endemic.

FILICES.

174. *Gleichenia circinata*, Sw. At 3,000 feet. No. 6101.
On all mountains.

175. *Gleichenia flagellaris*, Spr. At 3,000 feet. No. 6102.

176. *Alsophila commutata*, Mett. At 2,800 feet. No. 6042.

High mountains Malay Peninsula.

177. *Hymenophyllum Neesii*, Hook.

178. *Hymenophyllum Blumeianum*, Spr. No tickets.

179. *Davallia solida*, Nees. At 3,800 feet. No. 6045.

Common all over peninsula.

180. *Davallia bullata*, Wall. Kedah Peak. 3,500 feet.
Got this on the precipice at the top of Kedah Peak. It is not common in the peninsula. No. 6130.

181. *Humata angustata*, Sm. At 3,000 feet. No. 5991.

182. *Lindsaya flabellulata*, Dry. At 2,500 to 3,000 feet.
Common on high mountains. No. 6095.

183. *Matonia pectinata*, R. Br. At 3,000 feet. No. 6100.
On all our mountains.

184. *Oleandra neriiformis*, Cav. At 2,500 to 3,000 feet.
Nos. 5979, 6024.

On all our mountains.

185. *Polypodium decorum*, Brack. Kedah Peak. No. 6020

186. *Polypodium* (Pleopeltis) *stenophyllum*, Bl. At 2,500 to 3,000 feet. No. 6021.

Common in mountain districts.

187. *Polypodium* (Pleopeltis) *ineurvatum*, Bl. At 2,500 to 3,000 feet. No. 6022.

Mountains of Malaya.

188. *Dipteris Horsfieldii*, Benn. At 2,500 to 4,000 feet.
Fairly common. No. 6023.

Common on our shores and mountains.

LYCOPODIACEÆ.

189. *Lycopodium Hippiuris*, Bl. At 3,500 feet. No. 6078.
Distrib. Malay peninsula.

190. *Lycopodium cernuum*, Sw. At 3,800 feet. No. 6029.
Distrib. All tropics.

191. *Lycopodium phlegmaria*, L. At 3,500 feet. No. 6002
on damp, open ground.

Common all over Tropical Asia.

192. *Selaginella Belangeri*, Spring. *S. proniflora*, Bak.
At 3,000 feet. No. 6097.

Distrib. Malayan mountains.

193. *Selaginella canaliculata*, Spring. Gurun. No. 6174.
Common in hill districts.

MUSCI.

BY C. H. WRIGHT.

194. *Syrrhopodon revolutus*, Dozy & Molk. At 3,000 feet.
No. 6091.

LICHENES.

BY MISS E. M. WAKEFIELD.

195. *Cladonia bellidiflora*, Hærke. At 3,000 feet. No.
6009. Fructification scarlet.

VIII. A COLLECTION OF MAMMALS AND BIRDS FROM PULAU PANJANG OR PULAU MAPOR, RHIO-LINGGA ARCHIPELAGO.

By HERBERT C. ROBINSON, C.M.Z.S., M.B.O.U.

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The mammals of the Rhio-Lingga Archipelago have been investigated in great detail during the last fifteen years and large collections have been made on the majority of the islands, by Dr. W. L. Abbott, Mr. C. B. Kloss and the Federated Malay States Museums, these collections having been reported on by Messrs. G. S. Miller, R. W. Lyon, Oldfield Thomas and R. W. Wroughton in the following papers.

Gerritt S. Miller, Jr. ... "Mammals collected by Dr. W. L. Abbott on Islands in the South China Sea."

Proc. Acad. Sci. Washington, ii, pp. 203—246 (1900).

Gerritt S. Miller, Jr. ... "Mammals collected by Dr. W. L. Abbott in the Region of the Indragiri River, Sumatra."

Proc. Acad. Nat. Sci. Philadelphia, 1902, pp. 143—159.

Gerritt S. Miller, Jr. ... "Seventy New Malayan Mammals."

Smithsonian Misc. Coll. vol. 45, pp. 1—73 (passim) (1903).

Gerritt S. Miller, Jr. ... "The Mammals collected by Dr. W. L. Abbott in the Rhio-Lingga Archipelago."

Proc. U. S. Nat. Mus. vol. xxxi, pp. 247—286 (1906).

Gerritt S. Miller, Jr. ... "The Mouse Deer of the Rhio-Lingga Archipelago: A study of specific Differentiation under uniform environment."

Proc. U. S. Nat. Mus. vol. xxxvii, pp. 1—9, Pls. 1—8 (1909).

Gerritt S. Miller, Jr. ... "Fifty-one new Malayan Mammals."

Smithsonian Misc. Coll. vol. 61, No. 21, pp. 1—28 (1913).

December, 1916.

Marcus Ward Lyon, Jr. "Mammals of Batam Island, Rhio Archipelago."

Proc. U. S. Nat. Mus. vol. xxxi, pp. 653—657 (1907).

Marcus Ward Lyon, Jr. "Additional notes on mammals of the Rhio-Lingga Archipelago, with descriptions of new species and a revised list."

Proc. U. S. Nat. Mus. vol. xxxvi, pp. 479—491, Pl. 39 (1909).

Marcus Ward Lyon, Jr. "Tree Shrews: an Account of the Mammalian Family, Tupaidæ."

Proc. U. S. Nat. Mus. vol. xlv, pp. 1—88. Pls. 1—11 (1913).

Oldfield Thomas, and R. C. Wroughton. "Diagnoses of New Mammals collected by Mr. H. C. Robinson in the Malay Peninsula and Rhio Archipelago."

Ann. and Mag. Nat. Hist. (8) iii, pp. 439—441 (1909).

Oldfield Thomas, and R. C. Wroughton. "On Mammals from the Rhio Archipelago and Malay Peninsula, collected by Messrs. H. C. Robinson, C. B. Kloss and E. Seimund and presented to the National Museum by the Government of the Federated Malay States."

Journ. Fed. Malay States Mus. iv, pp. 99—129 (1909).

D. G. Elliot ... "Descriptions of apparently new species and sub-species of Monkeys of the genus, *Callicebus*, *Lagothrix*, *Papio Pithecus*, *Cercopithecus*, *Erythrocebus* and *Presbytis*."

Ann. and Mag. Nat. Hist. (8) iv, pp. 244—274 (1909).

D. G. Elliot ... "Descriptions of some new species of monkeys of the genera *Pithecus* and *Pygathrix* collected by Dr. W. L. Abbott and presented to the United States National Museum."

Proc. U. S. Nat. Mus. vol. xxxviii, pp. 343—352 (1910).

Almost the largest island that has remained unvisited by any naturalist is the one now under discussion. In view of its proximity to Bintang, the largest of the group, and the one possessing the richest fauna, it was thought that Pulau Mapor might also possess species of interest and I accordingly arranged to visit it and spent a few days there at the end of May and the beginning of June, 1915.

Our most cordial thanks are due to Mr. H. Spakler, at that time Consul General of the Netherlands in Singapore, who on this, as on numerous previous occasions proved most helpful in

obtaining for us the necessary permits from the local Dutch authorities. We are also indebted to the Resident of Rhiow, who instructed his local officers to afford us all the assistance in their power.

GEOGRAPHICAL.

Pulau Panjang or Mapor, as it is more generally known by its inhabitants is an island of roughly triangular shape with a greatest length and breadth of about three and a half to four miles, situated in Lat. $104^{\circ}50'$ E. and Long. 1° N. about 10 miles from the east coast of Bintang, the straits separating it from that island carrying about twelve fathoms, though a bank with only 6 to 8 fathoms running from the S.E. of Mapor very nearly joins it to the larger island.

Except on the north and N.E. corner it is surrounded by a fringing reef of coral of varying breadth, with many outlying "mushrooms," and must therefore be approached with the greatest caution by those not in possession of local knowledge. A bay on the N.E. corner however, afforded good anchorage in about six fathoms mud and is free from dangers, though the swell that frequently sets in from the East even in the S.W. monsoon makes it inconvenient for small vessels. The surface of the island is undulating and even rugged on the eastern side, the maximum elevation being about 340 feet. On this side there is still a good deal of old jungle though much of the better timber has been felled by Chinese for exportation to Singapore. In the remaining parts of the island most of the available land has in times past been cleared for the planting of gambier and on those plantations being abandoned has relapsed into thickets of Straits *Rhododendron* and *resam* (*Melastoma* and *Gleichenia*) very difficult to penetrate. In parts, however, the original forest, which consisted largely of a valuable timber tree (*tembusu*) (*Fagraea fragrans*) is taking hold again, the tree mentioned springing up again readily from stools.

On the western shore there are, in places, considerable flat areas, largely overgrown with lalang, and it is here, where they are sheltered from the violence of the N.E. monsoon, that the villages of the native inhabitants are found. These people are *Orang Laut* or *Jakun*, who under different tribal names are widely spread through the southern portion of the Malayan Peninsula and throughout the Rhio-Lingga Archipelago and portions of the adjacent low lying parts of Sumatra. They are of Proto-Malayan stock, at one time spoke a somewhat peculiar dialect and have only, in comparatively recent times, become converts to Islam, though they are now loathe to confess that they are other than Malays proper. In Mapor, where there are probably not more than a hundred individuals at the outside, they earn a precarious livelihood by fishing during the S.W. monsoon and by

collecting live turtle and tortoise-shell, the former of which are sold in Singapore while the latter finds a market in Rhio. They possess small kampongs where bananas, maize, *ubi kayu* and sugar cane are cultivated, but no rice is grown.

We stopped a couple of days on the Eastern side but being warned that the anchorage there was precarious in bad weather were conducted by a very tortuous and intricate channel to a little pool (it was hardly more) on the western side near an islet known as Mentigi, a commonplace name among orang laut people, where we remained a week.

The collecting was disappointing but besides the species actually secured we caught a fleeting glimpse of a *Tragulus*, while pig of both species, *Sus oi* and *Sus rhionis* are known to occur, but without dogs are difficult to obtain. In the sheltered bays in the vicinity Duyong (*Halicore duyong*) are very fairly common and are much hunted, cigarette holders made out of the canines being much prized and commanding a high price in Tanjong Pinang (the capital of Rhio). On our way back to Singapore we shot a small dark brown porpoise, one of a school? (*Flatanista sp.*) of fifteen or twenty, but it was seized by a shark and torn to pieces before we could secure it.

Of reptiles we got hardly any: *Cyclemys platynotus* is fairly common and so are *Draco volans*, *D. melanopogon* and *Mabuia multifasciata*, while we also secured specimens of the Hawks bill turtle. Near Mentigi was a pen in which were some fifty or sixty green turtle (*Chelone mydas*) which were bought up by a Chinaman for sale in Singapore and fed on a variety of sea-grass common in shallow bays in the neighbourhood.

SYSTEMATIC.

A. MAMMALS.

PITHECUS FASCICULARIS (Raffles).

Pithecus bintangensis, Elliot, Ann. & Mag. Nat. Hist. (8) iv, p. 257 (1909); id. Rev. Prim. ii, p. 246, pl. xxvii (1912).

♂ ad. Mentigi, West Side Pulau Mapor, 6th June, 1915. F.M.S. No.

This *kra* belongs to the group with dark iron grey hands and feet, tail blackish above, on its basal portion silvery grey beneath, back of head and mantle annulated with black and rufous orange, the latter colour fading away towards the rump. Limbs and sides annulated with black and silvery grey. Dimensions (taken in the flesh). Head and Body, 395; (456) tail, 535; (505) hindfoot, 135 (117.5) ear 25 mm. (29).

Skull: Total length, 114 (105); occipito nasal length, 95 (85.5); zygomatic breadth, 73 (72.5); length of upper tooth row excl. canine 28.0 (26.7) mm.

The skull characters derived by Elliot from the small series at his command are worthless as subspecific characters

and the colour differences are also of dubious value, so I prefer not to apply any subspecific name to this monkey. In view of the general zoological affinities of the Rhio-Lingga archipelago it will probably prove to be allied rather to the Sumatran than to the Peninsular race and I have therefore used Raffles name which was conferred on specimens obtained in the neighbourhood of Bencoolen.

Measurements in Parentheses are those of the type of *Pithecius binlangensis* as given by Elliot.

CROCIDURA *MAPORENSIS*, Robinson & Kloss, sp. nov.

Type. Sub-adult female (skin and skull) collected on the East side of Pulau Mapor, Rhio-Lingga Archipelago, on 5th June, 1915, by H. C. Robinson.

Diagnosis. In colour closely resembling *C. aoris*, * but smaller, about the same size as *C. negligens*† but colour less pure grey. Skull rather broader than in the allied forms.

Skull: Broader relatively than that of *C. aoris* and rather more inflated in the anterior portion of the frontal region than in that species.

Measurements: Greatest length (23.8)‡; basal length, 18.5 (21.1); lachrymal breadth of rostrum, 5.1 (4.9); greatest breadth above molars, 7.3 (7.9); cranial breadth above mastoid, 10.6 (10.5); maxillary tooth row, including incisors, 9.3 (10.0).

Remarks. Though the material is very bad, the only specimen obtained being much damaged by the trap and by ants, we have little doubt that the Mapor shrew is a fairly distinct form. It is the first occurrence of the genus in the archipelago.

TUPAIA *CASIANEA* *REDACTA* subsp. nov.

Type: ADULT male (skin and skull), No. 355/15, Federated Malay States Museum, collected on East side, Pulau Mapor, Rhio Archipelago, 7th June 1915, by H. C. Robinson.

Characters:—Extremely close to *Tupaia castanea*, Miller, ¶ out somewhat smaller, the underparts especially the mesial streak and the thighs more rusty "ferruginous" Ridgeway (Pl. XIV) against "ochraceous tawny" (Pl. XV), and with the upper surface more chestnut, less maroon, mingled "Hays Russet (Pl. XIV) and 66 Xanthine Orange" (Plate III) against "Maroon" (Plate I).

Colour:—Top of head and sides of the face, hands and feet annulated black and buffy ochraceous, a buff ring round the eye. Rest of the upper surface rusty ferruginous, many of the hairs with glistening black tips. Tail except at the base above, where the hairs are tipped with black, almost uniform

* Ann. & Mag. Nat. Hist. (8) x, p. 589 (1912).

† Ann. & Mag. Nat. Hist. (8) xiii, p. 232 (1914).

‡ Measurements in parentheses are those of the type of *Crocidura aoris*.

¶ Smithsonian Misc. Coll. vol. 45, p. 54, 1903; Lyon, Proc. U.S. Nat. Mus. 4, p. 90, pl. 10, fig. 9 (1913.)

orange ferruginous, the hairs lighter below at their bases. Streaks from the ears orange buff, by no means conspicuous, beneath rusty ferruginous, a patch on breast and mesial line uniform, the rest with greyish bases to the hairs.

Skull:—Smaller than that of *T. castanea*, with the muzzle relatively shorter and blunter and the cranium less elongate. Palatal vacuities in both specimens available less defined than in the skulls of *T. castanea* in the collection. Teeth not different from those of the typical form.

Measurements:—Collectors external measurements (taken in the flesh):—

Head and body 172 (201); * Tail, 141 (151); Hindfoot, 38 (42.5) mm.

Cranial measurements: greatest length, 50.0 (54.0); basal length, 43.9 (46.3); palatal length, 26.7 (28.1)†; zygomatic breadth 24.9 (27.8); least interorbital breadth, 14.0 (15.0); cranial breadth, 20.0 (20.3); breadth of rostrum at diastema, 6.8 (7.1); lachrymal notch to tip of premaxillaries, 20.8 (23.0); upper molar series, 18.0 (19.2).

Specimens examined. The type and an immature female, (canine and *pm* at alveolus from the same locality.)

Remarks. The type specimen, though adult, is younger than the available series of seven skulls and four skins of *T. castanea*, from Pulau Bintang, having the orbital ring not completely ossified. It is however practically adult and has probably attained its full size. The other specimen is very considerably younger. Both are in somewhat worn pelage, while those from Bintang are in fresh, but I think it practically certain that the differences in colour will persist to a greater or less degree when specimens in similar condition are available for study. The differences are certainly of no less order than have been used to establish the majority of races formulated of late years.

SCIURUS VITTATUS MAPORENSIS, subsp. nov.

Type:—Adult female (skin and skull). Federated Malay States Museums No. 289/16, collected on the West side of Pulau Mapor, Rhio Archipelago, on June 6th, 1915, by H. C. Robinson.

Characters: Most closely resembling the race from Pulau Tinggi but smaller, with the black lateral stripes, clearer and less sullied. Colour of the under surface varying from ochraceous buff through ochraceous orange to ochraceous tawny, whereas in the other races from the Rhio Archipelago the

* Measurements in parentheses are those of an adult male of *Tupaia castanea* collected at Sungei Biru, Pulau Bintang, June 12th, 1908. F.M.S. Mus. No. 1792/08.

† Measurements in parentheses are those of an adult female of *Tupaia castanea* collected at Pasir Panjang, Pulau Bintang on June 9th, 1908, F.M.S. Mus. No. 1790/08.

colour is more clearly rufous or "vinaceous rufous." Resembling *Sc. v. sublutens* in these respects but a much smaller form.

Measurements: External measurements of the type, taken in the flesh: head and body, 185, (176)'; tail, 162, (158); Hf., 41.5, (40); ear, 15 mm., (16.5).

Average and extremes of ten specimens; head and body, 183, (170-192); tail, 160.5, (142-175); hind-foot, 42.3, (40-46.5); ear, 16, (15-18). Cranial measurements of type: greatest length, 45.8 (45.1)*; condylobasilar length, 39.1 (38.8); diastema, 10.4 (10.3); zygomatic breadth, 28.3 (26.0); median length of nasals, 13.3 (13.1); upper molar series including pm³ 8.9, (8.3).

Average and extremes of ten specimens: greatest length, 47.1, (45.6-48.5); condylo-basilar length, 40.1, (38.2-42.0); diastema, 10.6 (10.0-11.2); zygomatic breadth, 28.4 (27.8-29.3); median length of nasals, 14.0 (13.3-14.8); maxillary tooth row including pm³, 8.9, (8.4-9.3) mm. For detailed measurement see table on p. 67.

Specimens examined. Fifteen, all from Pulau Mapor.

RATTUS SURIFER LINGENSIS (Miller).

Mus lingensis, Miller, Proc. Acad. Nat. Sci. ii, p. 266 (1900); id. Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 154; id. Proc. U.S. Nat. Mus. xxi, p. 266 (1900); Lyon, op cit, xxi, p. 655 (1907); Thos. and Wrought. Journ. Fed. Malay States Mus. iv, p. 125 (1909); Lyon, Proc. U.S. Nat. Mus. xxxvi, p. 484 (1909).

A very large series of this rat was collected on Mapor which for the present we refer to this race. The colour characters assigned to it as compared with *R. surifer* from the mainland hold good, viz., a dull, more clay-coloured tint with much less ochraceous orange on the flanks and a greater admixture of black on the back, but we are unable to see that the *Rhio* form has a narrower palate as stated by Miller. The tail is perhaps, on an average, relatively shorter than in the mainland form and the skull is somewhat more heavily built with a greater development of the ridges.

The skull dimensions, even if equally adult animals from the same island are compared are, as Lyon notes, variable. Specimens from Karimon and Kundur seem to be the largest and those from Battam and Bintang on the whole dullest in tint. The race is much more closely related to those inhabiting the islands of the east coast of the Peninsula than to the lightly built, bright coloured animal found in Singapore. *Epimys surifer leonis* (Robinson and Kloss). About fifty specimens, adult and young, were obtained. For measurements see p. 68.

* Measurements in parentheses those of the type of *Sciurus vittatus famulus* from Pulau Dayang nr. Pulau Aor (Robinson, Ann. and Mag. Nat. Hist. (8) X p. 592 (1912).

RATTUS RATTUS BATIN, subsp. nov.

Type:—Adult male, aged (skin and skull). Collected at Mentigi, West side of Pulau Mapor or Panjang, Rhio Archipelago, on June 6th, 1915, by H. C. Robinson. Federated Malay States Museums No. 304/15.

Characters:—A member of that section of the *Epinys rattus* group, characterized by somewhat slender feet, hispid, but not very spiny pelage and marked development of long black piles on the lower back. Separable from the form* inhabiting the adjacent islands of Bintang and Battam by the very much lighter colour above and by the somewhat larger bullae.

Measurements:—External dimensions of the type, taken in the flesh: head and body, 208 (180); tail, 218 (195); hind-foot, 35.5 (34), ear 22 (20.5). Extremes of eight specimens, head and body, 171–208; tail, 193–218; hindfoot, 33.5–35.5; ear, 20–22.

Cranial measurements of type: greatest length, 44.4 (44.0); condylo-basilar length, 39.0 (39.0); diastema, 12.4 (12.9); zygomatic breadth, 20.0 (20.1); median length of nasals, 16.0 (16.3); upper molar series, 6.8 (6.9).

Extremes of twelve specimens: greatest length, 41.5–44.4; condylo-basilar length, 36.3–39.0; diastema, 11.6–12.6; zygomatic breadth, 18.8–21.2; median length of nasals, 14.0–16.1; upper molar series, 6.5–7.2 mm. For detailed measurement see table on p. 69.

Specimens examined:—Fifteen, from the east and west sides of Pulau Mapor.

Remarks:—The series examined, which was trapped both in old jungle and in the vicinity of the huts of the somewhat primitive *orang laut* people inhabiting the island are fairly uniform, the principal variation being in the degree of distinctness in the line of separation of the light undersurface from the flanks. The race closely resembles a form, as yet un-named, inhabiting the western islands of the Archipelago but appears to be somewhat more robust. The intrusion in the central islands of a race, *R. r. rhionis* which closely resembles the north European *R. rattus rattus* is a curious and as yet unexplained fact.

* *Mus rattus rhionis*, Thos. & Wrought. Ann. and Mag. Nat. Hist. (8) iii, p. 441 (1909). Measurements in parentheses are those of an adult male topotype of *Mus rattus rhionis*, Thos. & Wrought. F.M.S. Mus. No. 2086/08.

MEASUREMENTS OF *Callosciurus vittatus maporensis*, ROBINSON.

| | Sex. | Head and Body. | Tail. | Hind-foot. | Ear. | SKULL | | | | | Condition of teeth | F. M. S. No. | REMARKS |
|----------------------|------|----------------|-------|------------|------|------------------|--------------------------|-----------|-------------------|----------------------|--------------------|--------------|---------|
| | | | | | | Greatest length. | Condylar-basilar length. | Dia-stema | Zygomat. breadth. | Median nasal length. | Upper tooth row. | | |
| Pulau Mapor (E side) | ♀ | 192 | 175 | 46.5 | 15 | 48.1 | 42.0 | 10.0 | .. | 14.2 | 8.8 | 287/15 | Adult. |
| " (W. side) | ♂ | 170 | 155 | 41.5 | 16 | 45.8 | 39.1 | 10.4 | 28.3 | 13.3 | 8.9 | 289/15 | Type |
| " | ♂ | 185 | 162 | 41.5 | 16 | 46.2 | 39.3 | 10.2 | 28.0 | 13.3 | 9.0 | 290/15 | " |
| " (E. side) | ♂ | 170 | .. | 41 | 16 | 47.0 | 40.0 | 10.0 | 28.1 | 14.3 | 8.4 | 291/15 | " |
| " | ♂ | 192 | 171 | 45 | 16 | 47.1 | 40.1 | 10.4 | 29.0 | 14.8 | 8.9 | 292/15 | " |
| " (W side) | ♀ | 174 | 148 | 40.5 | 15 | 45.6 | 38.2 | 10.0 | 27.9 | 14.0 | 8.8 | 293/15 | " |
| " | ♀ | 190 | 157 | 40 | 16 | 46.8 | 40.3 | 10.8 | 27.8 | 13.9 | 8.9 | 294/15 | " |
| " (E side) | ♀ | 186 | 165 | 42 | 16 | 47.8 | 39.9 | 10.0 | 28.7 | 14.2 | 9.3 | 358/15 | N C M * |
| " | ♀ | 185 | 148 | 43 | 16 | 47.9 | 40.4 | 10.0 | 28.4 | 14.2 | 9.1 | 360/15 | " |
| " | ♂ | 186 | 164 | 43 | 18 | 48.5 | 41.9 | 11.2 | 29.3 | 13.8 | 9.1 | 361/15 | " |

* Native collectors' skin measurements

MEASUREMENTS OF Rats from Pulau Mapor.

| SKULL | | | | | | | | | | | | | | |
|----------------------------------|-----|---------------|------|-----------|------|-----------------|-------------------------|-----------|--------------------|---------------------|-----------------|--------------------|----------|------------------|
| | Sex | Head and Body | Tail | Hind foot | Ear | Greatest length | Cord ylo basilar length | Dia stema | Zygo matic breadth | Median nasal length | Upper tooth row | Condition of teeth | F M S No | REMARKS |
| Rattus rattus lingensis (Miller) | | | | | | | | | | | | | | |
| East side, Pulau Mapor | ♀ | 136 | 164 | 37.5 | 21 | 43.1 | 36.2 | 12.8 | 20.0 | 16.7 | 6.0 | M worn | 297/15 | |
| Mentigi, West side Pulau Mapor | ♀ | 209 | 176 | 40 | 21 | 46.1 | 39.8 | 13.2 | .. | 18.2 | 6.3 | V | 298/15 | |
| East side, Pulau Mapor | ♀ | 183 | 162 | 37.5 | 22 | 43.7 | 36.2 | 12.2 | 19.6 | 16.1 | 6.2 | M | 299/15 | |
| " | ♀ | 190 | 159 | 35.5 | 21 | 42.1 | 36.5 | 12.0 | 20.1 | 16.7 | 6.1 | V | 300/15 | |
| " | ♂ | 203 | 171 | 40.5 | 22 | 47.0 | 34.9 | 13.2 | 20.7 | 18.8 | 6.2 | Sl | 301/15 | |
| Mentigi, West side Pulau Mapor | ♂ | 207 | 173 | 41.5 | 23 | 46.3 | 39.2 | 13.2 | 21.1 | 18.5 | 6.1 | Sl | 303/15 | |
| East side, Pulau Mapor | ♀ | 214 | 167 | 41.5 | 23 | 46.1 | 39.2 | 14.6 | 20.3 | 18.3 | 6.2 | | 305/15 | |
| " | ♀ | 200 | 172 | 37 | 21.5 | 44.1 | 41.9 | 13.0 | 19.6 | 18.6 | 6.1 | V | 309/15 | |
| " | ♂ | 205 | 191 | 40 | 23 | 45.2 | 39.0 | 13.1 | 20.0 | 18.2 | 6.3 | V | 316/15 | |
| " | ♂ | 201 | 166 | 37 | 23 | 44.2 | 37.8 | 13.0 | 20.3 | 17.1 | 6.2 | Sl | 320/15 | |
| " | ♀ | 183 | 155 | 38 | 22 | 44.7 | 38.0 | 2.8 | 20.0 | 17.2 | 6.2 | M | 326/15 | |
| Mentigi, West side, Pulau Mapor | ♂ | 212 | 170 | 40 | | 40.3 | 34.2 | 12.9 | 20.2 | 19.6 | 6.3 | Sl | 329/15 | |
| East side Pulau Mapor | ♂ | 162 | 153 | 36 | 22 | 43.6 | 37.3 | 13.2 | 18.2 | 18.0 | 6.2 | | 331/15 | Sub Adult N C M* |
| " | ♀ | | | | | 43.1 | 37.2 | 13.0 | 20.0 | 18.4 | 6.0 | Sl | 334/15 | Adult N C M |
| " | ♀ | 190 | 170 | 36 | 22 | 45.8 | 38.9 | 13.1 | 21.0 | 18.4 | 6.8 | | 337/15 | Adult N C M |
| " | ♀ | 192 | 158 | 38 | 22 | 44.9 | 38.6 | 13.0 | | 17.1 | 6.3 | | 341/15 | " |
| " | ♂ | | | | | 42.3 | 35.4 | 13.3 | 18.3 | 16.3 | 6.2 | Un | 342/15 | Sub Adult N C M |
| " | ♂ | 196 | 170 | 38 | 23 | 46.5 | 39.0 | 13.4 | 21.1 | 18.8 | 6.3 | | 370/15 | Adult N C M |

* Native collectors skin measurements

MEASUREMENTS OF Rats from Pulau Mapor—Continued

| — | Sex | Head and Body | Tail | Hind foot | Ear | Greater length | (cond. of bilateral length) | SKULL | | | Condition of teeth | F M S No | REMARKS |
|--------------------------------------|-----|---------------|------|-----------|------|----------------|-----------------------------|------------|--------------------|---------------------|--------------------|----------|---------------|
| | | | | | | | | Ina ster a | Zygo ma ic breadth | Median nasal len. t |  |  |  | Upper tooth row |
| <i>Rattus rattus</i> | | | | | | | | | | | | | |
| lingensis (Miller)—Cont. | | | | | | | | | | | | | |
| East Side Pulau Mapor | | | | | | | | | | | | | |
| ♂ | ♂ | 188 | 15 | 35 | 23 | 43.1 | 30.3 | 12.7 | 19.4 | 15.0 | 6.1 | 371/15 | Adult N C M * |
| ♀ | ♀ | 182 | 15.5 | 36 | 25 | 43.3 | 30.7 | 12.1 | 19.4 | 17.0 | 6.1 | 372/5 | |
| ♀ | ♀ | 182 | 15.5 | 36 | 25 | 43.3 | 30.7 | 13.5 | 20.3 | 17.0 | 6.2 | 373/5 | |
| ♀ | ♀ | 195 | 16.6 | 37 | 3 | 45.3 | 32.0 | 11.8 | 20.9 | 17.2 | 6.3 | 379/15 | |
| ♂ | ♂ | 195 | 16.6 | 37 | 3 | 45.3 | 32.0 | 13.0 | 19.3 | 17.7 | 6.1 | 380/15 | |
| ♀ | ♀ | 195 | 16.6 | 37 | 3 | 45.0 | 38.4 | 13.0 | 19.4 | 15.3 | 6.3 | 387/15 | Adult aged |
| <i>Rattus rattus</i> batin | | | | | | | | | | | | | |
| East side Pulau Mapor | | | | | | | | | | | | | |
| ♂ | ♂ | 171 | 19.7 | 35.5 | 20 | 42.0 | 36.6 | 12.0 | 20.0 | 15.0 | 6.8 | 302/15 | Type |
| ♀ | ♀ | 188 | 20.2 | 34 | 20 | 42.0 | 37.1 | 11.0 | 20.0 | 15.0 | 6.7 | 304/15 | |
| ♀ | ♀ | 208 | 21.8 | 35.5 | 22 | 44.4 | 39.0 | 11.4 | 20.1 | 16.0 | 6.8 | | |
| Mentigi West side Pulau Mapor | | | | | | | | | | | | | |
| ♂ | ♂ | 171 | 20.0 | 34.5 | 20 | 41.5 | 36.3 | 12.0 | 19.5 | 11.3 | 6.5 | 306/15 | |
| ♂ | ♂ | 183 | 10.3 | 35.5 | 21 | 42.5 | 37.1 | 12.0 | 18.8 | 14.7 | 6.0 | 311/15 | |
| ♀ | ♀ | 173 | 35 | 35 | 20.5 | 41.0 | 37.1 | 12.0 | 19.2 | 15.0 | 6.9 | 317/15 | |
| ♀ | ♀ | 177 | 20.6 | 34 | 20 | 41.0 | 37.1 | 12.0 | 19.2 | 15.0 | 6.9 | 319/15 | |
| ♀ | ♀ | 182 | 20.2 | 33.5 | 20 | 42.0 | 37.0 | 11.8 | 21.1 | 14.0 | 6.5 | 322/15 | |
| ♀ | ♀ | 182 | 20.2 | 33.5 | 20 | 42.0 | 37.0 | 12.0 | 21.8 | 16.0 | 6.6 | 338/15 | N C M |
| ♀ | ♀ | 182 | 20.2 | 33.5 | 20 | 43.2 | 37.8 | 12.0 | 20.0 | 16.1 | 7.1 | 346/15 | |
| ♂ | ♂ | 182 | 20.2 | 33.5 | 20 | 43.0 | 38.1 | 12.2 | 20.3 | 15.2 | 7.2 | 348/15 | |
| ♂ | ♂ | 182 | 20.2 | 33.5 | 20 | 43.2 | 37.3 | 11.6 | 20.3 | 15.2 | 7.1 | 351/15 | |
| ♀ | ♀ | 182 | 20.2 | 33.5 | 20 | 44.0 | 38.3 | 12.1 | 22.2 | 15.6 | 7.1 | 351/15 | |

* Native collectors skin measurement

II. BIRDS.

With the exception of a short list of birds collected on the "Lingga Islands," presumably Lingga itself, by the late Alfred Everetts' collectors by Dr. Hartert (Nov. Zool. vii, pp. 549-50 (1900) I am not aware of any account of the avifauna of any of the Rhio-Lingga Archipelago.

From an ornithologist's point of view most of the small Indo-Malayan islands lying within the 20 fathom line from larger land-masses are extremely uninteresting and Mapor, where, with the exception of two species of sun-birds, birds were very scarce both in species and individuals, proved no exception to this rule. A list of the specimens observed or obtained is however given, those of which no specimens were preserved being marked with an asterisk.

1. *TRERON NIPALENSIS*. Hodgs.

1 ♂

2. *OSMOTRERON VERNANS* (Linn.)

1 ♂, 1 ♀. Very common.

- *3. *MYRISTICIVORA BICOLOR* (Scop.).

Extremely abundant, roosting on the small islets off the coast.

4. *STERNA BERGII PELECANOIDES* (King).

Thalasseus bergii pelecanoides, Oberholser, *Proc. U.S. Nat. Mus.* 49, p. 523 (1915).

Common off the sand spits and reefs on the western side of the island. Two specimens, male and female, with the exposed culmen 61.5 and 64 mm. appear to belong to this race.

5. *AECIALITIS ALEXANDRINA* (Linn.)

Antea, vol. V, p. 142. A single male of the tropical race of the Kentish Plover in breeding plumage.

- *6. *NUMENIUS ARQUATA* (Linn.)

- *7. *NUMENIUS PHAEOPUS* (Linn.)

Both the Curlew and Whimbrel were fairly common round Mapor but were exceedingly wild and almost impossible to approach within gunshot.

8. *LIMONITES RUFICOLLIS* (Pall).

A single female shot on June 6th.

- *9. *ARDEA SUMATRANA*, Raffles.

- *10. *DEMIEGRETTA SACRA* (Gm.).

Common on the reefs.

- *11. *HALIAETUS LEUCOGASTER* (Gm.).

- *12. *HALIASTUR INTER MEDIUS* (Gurney).

Common as everywhere else on the Malayan coasts.

13. HALCYON ARMSTRONGI, Sharpe.

Antea, vol. V, p. 145.

1♂, 1♀.

Not very abundant.

14. PELARGOPSIS MALACCENSIS, Sharpe.

Ramphalcyon capensis hydrophila, *Oberholser, Proc. U. S. Nat. Mus.* 35, p. 677 (1909).

1♂.

By no means common.

I find it impossible to follow Mr. Oberholser in his arrangement of the Peninsular forms of this genus and consider that all specimens from Bandon southwards to Singapore and the Rhio Archipelago must be regarded as identical subspecifically though specimens from Koh Pennan (*Antea*, vol. V, p. 145, show an approach to *P. m. burmanica*, Sharpe, having a rather lighter pileum than the majority of Malayan specimens, though in this they agree with five skins, from the islands of Bintang, Battam and Mapor in the Rhio Archipelago which belong to the above cited *Ramphalcyon capensis hydrophila*, whose type locality is Singapore.

The dimensions of the Mapor specimen taken in the flesh were—Total length, 371; wing, 144; tail, 99; visible culmen, 85; bill from gape, 95; tarsus, 19.8 mm.

15. ANTHRACOCEROS CONVEXUS (Temm.)

1♂, 1♀ imm. Very fairly common.

16. HYPOTHYMIS AZUREA PROPHATA, Oberholser

Hypothymis azurea (Bodd.), *Hartert, tom. cit.* p. 550.

3♂, 1♀.

Fairly common.

17. MUSCITREA CINEREA, Blyth.

Muscitrea grisola (Blyth) *Antea*, vol. V, p. 148.

4♂, 2♀.

Very numerous in small patches of mangrove as elsewhere throughout the Malay Peninsula in similar situations.

18. PYCNONOTUS PLUMOSUS, Blyth.

3♂. Fairly common in secondary growth.

19. CITTOCINCLA MACRURA (Gm.)

Cittocincla tricolor (Vieill.). *Hartert, tom. cit.* p. 550.

1♂, 1♀ imm.

Common.

20. ORTHOTOMUS RUFICEPS (Less.)

Hartert, tom. cit. p. 549.

A single rather immature female.

21. PHYLLOSCOPUS BOREALIS (Blas.).

Antea, vol. V, p. 150.

One female shot on June 4th. A late date for this migrant.

22. *DISSEMURUS PARADISEUS* (LINN.)
Dissemurus platurus (Vieill.) *Hartert, tom. cit.* p. 550.
 3♂, 2♀. All in very worn plumage. Very common.
23. *EULABES JAVANENSIS* (Osbeck).
 2♀. Very common.
 Rather small in dimensions but not *E. intermedius*
 (A. Hay).
24. *CALORNIS CHALYBEA* (Horsf.)
Antea, vol. V, p. 151.
 1♂, 1♀, 1♀ imm. Common.
25. *AETHOPYGA SIPARAJA* (Horsf.)
 3♂. Common in open wastes covered with low
 shrubs.
26. *CYRTOSTOMUS PECTORALIS* (Horsf.)
Cinnyris pectoralis (Horsf.) *Hartert, tom. cit.* p. 550.
 7♂, 3♀.
 Very abundant on the sea shore.
27. *LEPTOCOMA HASSELTII* (Temm.)
Cinnyris hasselti (Temm.) *Hartert, tom. cit.* p. 550.
 6♂, 1♀. Very common, as the preceding species.
28. *ANTHREPTES MALACCENSIS* (Scop).
Anthreptes malaccensis (Scop.) *Hartert, tom. cit.*
 p. 550.
 2♀. In the coconut palms. Rare.
29. *DICAEUM CRUENTATUM* (Linn.)
Antea, vol. V, p. 152.
 1♂, 1♀. Not common.
30. *DICAEUM TRIGONOSTIGMA* (Scop.)
Dicaeum trigonostigma (Scop.) *Hartert, tom. cit.*
 p. 550.
 3♂. Common in small trees in scrub.

IX. ON A NEW RACE OF CALLOSCIURUS VITTATUS (RAFFLES) FROM SINGAPORE ISLAND.

By H. C. ROBINSON, C.M.Z.S.

CALLOSCIURUS VITTATUS SINGAPURENSIS, subsp. nov.

Type:—Adult female (skin and skull), Federated Malay States Museums, No. 1747/08, collected at Changi, north-east corner of Singapore Island, on July 27th, 1908, by H. C. Robinson and E. Seimund.

Characters:—Very closely related to *Sciurus peninsularis*, Miller* from the north bank of the Endau River, Eastern Pahang, but differing from the race in having the light element in the speckling of the upper surface, more ochraceous ferruginous and less olivaceous, the undersurface more ferruginous, less tawny. From *Sciurus vittatus sublutens*,† Thos. and Wrought., from South East Johore; it is at once separated by its noticeably brighter colouration on the belly and darker tail and from *Sc. v. nesiotus*,‡ Thos. and Wrought., by its broader and more clearly defined lateral black stripe. The absence of a clear red pencil to the tail beneath at once distinguishes from *Sc. v. miniatus*.§ Miller, of the Peninsula mainland from Trang to North Johore.

Measurements:—External measurements of the type taken in the flesh: head and body, 207; tail, 186; hindfoot, 47; ear, 17 mm.

Average and extremes of eight specimens: head and body, 203.5 (193–209); tail 193.8 (178–224); hindfoot, 46.1 (43–47); ear, 15.9 (15.5–17 mm.).

Cranial measurements of type. Greatest length, 51.9; condylo-basilar length, 44.1; diastema, 11.1; zygomatic breadth, 31.1; median length of nasals 15.6; maxillary tooth row, including pm³ 10.2 mm.

Average and extremes of eight specimens: greatest length, 50.6 (49.2–51.9); condylo-basilar length, 43.0 (41.8–44.1); diastema, 11.4 (10.8–12.0); maxillary tooth row including pm³ 10.0 (9.9–10.2).

Specimens examined:—Eight, all from the type locality.

Remarks:—Recent workers have included this form in *Sc. vittatus peninsularis* (Miller) which as now restricted is confined to a comparatively small area in Southern Pahang and Eastern Johore.

* Smithsonian Misc. Coll. vol. 45. p. 11 (1903)

† Journ. Fed. Malay. States Mus. iv. p. 116 (1909)

‡ Journ. Fed. Malay States Mus. iv. p. 115 (1909)

§ Proc. Acad. Sci. Washington, ii. p. 79 (1900).

MEASUREMENTS (IN MILLIMETRES) OF *Callosciurus vittatus singaporensis*.

| | Sex | Head and Body. | Tail. | Hind foot. | Ear. | SKULL. | | | | | Condition of teeth. | F.M.S. No. | REMARKS. |
|-----------------------------|-----|----------------|-------|------------|------|------------------|--------------------------|-----------|-------------------|----------------------|---------------------|------------|---------------------|
| | | | | | | Greatest length. | Condylor-basilar length. | Dia-stema | Zygomatic breadth | Median nasal length. | Upper tooth row. | | |
| Changi, N. E. Singapore Id. | ♀ | 204 | 178 | 44 | 15 | 50.3 | 42.3 | 11.2 | 29.6 | 14.5 | 9.9 | worn | 1741/08 Adult |
| " | ♀ | 201 | 184 | 47 | 15.5 | 51.3 | 43.2 | 11.8 | 30.3 | 15.3 | 10.0 | Sl. | 1744/08 " |
| " | ♀ | 201 | 184 | 47 | 15.5 | 50.1 | 42.0 | 11.0 | 30.7 | 15.1 | 10.0 | MI. | 1745/08 " |
| " | ♀ | 193 | 184 | 47 | 16 | 49.2 | 41.8 | 10.8 | 29.7 | 14.2 | 10.0 | Un | 1746/08 Sub-Adult |
| " | ♀ | 207 | 186 | 47 | 17 | 51.9 | 44.1 | 11.1 | 31.1 | 15.6 | 10.2 | " | 1747/08 Adult Type. |
| " | ♂ | 203 | 212 | 43 | 16 | 51.1 | 43.6 | 12.0 | 31.8 | 15.8 | 10.0 | MI. | 368/12 " N.C.M. * |
| " | ♀ | 209 | 198 | 47 | 17 | 50.8 | 43.8 | 11.2 | 30.3 | 15.2 | 9.9 | Sl. | 370/12 " |
| Bukit Timah, Singapore Id. | ♀ | 210 | 224 | 47 | 15 | 50.0 | 43.0 | 11.8 | 31.7 | 15.0 | 10.0 | Sl. | 2100/08 " |

* Native collectors skin measurements

X. NOTES ON THE SAKAI OF THE KORBU RIVER AND OF THE ULU KINTA.

By IVOR H. N. EVANS, B.A., *Assistant Curator and Ethnographical Assistant, F.M.S. Museums.*

In February 1916, I started from Sungei Siput on an expedition to the Korbu River (or Kerbau), intending, if everything was favourable, to pass from its headwaters to the Kinta River, and to return, via the Kinta Valley, to Tanjong Rambutan.

Sakai coolies were unobtainable; so not wishing to take Malays, even if I could get them, as they always welcome every opportunity of plundering the Sakai. I finally hired three elephants, with drivers, to take my baggage to Kuala Larek on the Korbu. Between Jalong and that place, I hoped to be able to recruit Sakai coolies, as the Penghulu of Sungei Siput told me that he thought that I should be able to obtain them. Turning off the main road at Plang we followed the elephant track which runs from that place to Jalong. This is much longer than the bridle-path, a distance of only about ten miles. We reached Jalong on the second day from Sungei Siput, passing two Sakai settlements on the first day, one near the Krodah River, and another between the Krodah (or Kerdah) and Sungei Siput. I saw one or two men from them and they seemed very much civilised, but I did not visit their houses. On our arrival at Jalong, where there is a loading stage for elephants, we pushed on for about another mile and a half to a Sakai settlement called Simpang, which is situated not far above Kuala Lengkar. Here I tried to obtain coolies from Toh Intan, the headman, but he pointed out that, besides himself, there were only five men in his village at the time, and that two of these were suffering from ulcers, and were unfit for work. Questioned about the possibility of getting men at Kuala Larek, he told me that there were none there except his father and one youth. He further stated that a great many Sakai had died in the district recently. In spite of this, I resolved to go on to Kuala Larek on the morrow to see for myself if what he told me was true. We therefore started fairly early the next morning. On the way we passed two Sakai clearings, one with ripe padi standing in it, the other with felled trees still lying everywhere. Both these had, so Toh Intan, who came with us, informed me, been deserted owing to the death of the head of the house. Arrived at Kuala Larek, I found that Toh Intan's information was perfectly correct; so there remained nothing to do but to return to Sungei Siput. Our first day, on the way back again, took us to Simpang, where we had rather an exciting night, as a herd of wild elephants broke into the Sakais' padi crops and, after destroying nearly the whole of them, were driven off with considerable difficulty. From Simpang

we walked, on the next day, to Sungei Siput, via the bridle-path, leaving the elephants with the baggage to follow the track, which we had made use of before. These animals arrived at Sungei Siput at about 4 p.m. on the day after.

There is little to note with regard to the few Sakai we met on the Korbu River. Traces of Negrito admixture could be detected in some individuals, both in their features and in the character of their hair. In Toh Intan's village there seemed to be very few articles which could be classed as distinctively Sakai, and the only specimen of much interest that I purchased was a heavy carved wooden comb, of a type which seems to be only used by the Kinta and Korbu aborigines. The other objects that I bought were a long mat and two or three carrying baskets. There were no blow-pipes in the settlement. According to Toh Intan, his people speak the same dialect as the Sakai of the Plus and Kinta Rivers. With the former they are in constant contact, but they rarely have anything to do with the latter. Two of the houses in the settlement were of a curious type and were turreted, one bearing two the other a single erection of this kind. On the former, one turret was ornamented with a curiously carved decoration made of small pieces of wood, the other, as was the first, was roofed over at the top with a piece of board, and had lost its ornament. On the second house the single turret was crowned by an old kerosine tin, filled with earth, in which plants of some kind were growing. Toh Intan's own house was well built, and consisted of a large central sleeping room, with a cook-house adjoining it on one side, and a lean-to building, which was not raised from the ground, on the other.

On leaving Sungei Siput I proceeded to Tanjong Rambutan, where, after some trouble, I procured a gang of Sakai coolies. Starting with these, we followed Messrs. Osborne & Chappel's pipe-line as far as the dam, and then the course of the Kinta River. Our destination was a Sakai settlement close to Bukit Daroh, which lies on the south bank of the Kinta.

The maps of the districts are, it would seem, exceedingly incorrect, but on the way we passed the mouths of the following rivers, the Proh, the Termin, the Takor, the Penoh, the Liang and the Pedang, as well as several other streams, most of them very small, whose names I have not thought necessary to record. Our first day's journey (we did not start until nearly midday owing to the late arrival of our coolies and to their insufficient numbers) took us to a little way above the pipe-line dam. On the second we camped by the edge of a deep pool in the Kinta River, which goes by the name of Lubok Singet, somewhere between Kuala Termin and the mouth of the Penoh River; and on the third night, we slept at Kuala Liang. On the fourth day, we arrived at Bukit Daroh, and might have reached there on the third, had the Sakai guide not led me to believe that it was a long way further on. A mountain, which the Sakai told me was Gunong Semawak, was visible

from the top of their clearing. A large hill, called Gunong Takai, was in view across the river, being nearer to us than Gunong Semawak. I do not know if this is the same as Gunong Takor (3,850) of the maps, but we passed the Takor River, which is not shown in them, on the second day out from Tanjong Rambutan. This joins the Kinta close to the mouth of the Termin, but on the opposite side.

The settlement at Bukit Daroh proved to be a single house of the communal type, about forty feet in length, by fifteen feet in breadth. The height of the floor from the earth was, at its maximum (the house was built on sloping ground), twelve feet. The building was supported on three somewhat irregular rows of posts, many of which were of but small diameter. The greatest height of the house from ground level was about twenty feet; there thus being only eight feet between the floor and the roof in the central line of the building; and much less at the sides owing to the slope of the thatch. The regular inhabitants composed four families, of some fifteen to twenty individuals in all, but they received frequent visits from other Sakai, who stopped a night or two with them. Sleeping platforms covered with sheet-bamboo were ranged along the walls, the interior not being divided off into rooms, and, between opposite benches, fires were kindled on fire-places of dried mud. Of these there were four, the burning logs being disposed radially on them so that it was only necessary to push the ends of the logs with the foot in order to replenish the fire. The sleeping platforms and the hearths took up so much room that it was necessary to step over each fire in passing from end to end of the house. During the day-time the fires were allowed to die out, or only kept smouldering; but, at about six o'clock in the evening, when it began to get cold (the clearing was situated at a height of about two thousand feet above sea-level), the logs were pushed together and the fire made up. At the time of my visit, which extended over ten days, the Sakai did not seem to be very actively engaged in agricultural work, though they were, according to what they told me, preparing a fresh clearing. That from which the crops—chiefly of tapioca—were then being used was situated at the top of the hill, on the side of which the house stood. In the morning some of the women used to go out to dig tapioca roots, and they returned late in the day bringing these, and occasionally some pumpkins. The latter were cut up and boiled in a large iron cauldron, the resulting broth or soup being first drunk in cocoanut shells and the pieces of the fruit then eaten separately. The tapioca roots were usually roasted in the embers of the fires. One day the Sakai were fortunate enough to kill a young Sambhur stag in a spring-spear trap. The meat was hacked from the body in lumps, and rammed down into joints of green bamboo, which were placed in the fire at an angle of about thirty degrees with their mouths projecting from the fire and supported on a stone. The deer having been killed near the river, which lay far

below the house, the majority of the men who went to help in cutting up the animal took the opportunity of having a bath, of which they were much in need.

Drinking water was drawn from a small spring, which was at a considerable distance from the house, but not quite so far away as the river. Bamboo-joints were used as water-vessels.

At night conversation, often in a loud tone of voice, was kept up till quite a late hour. During the heat of the day the majority of the people lay off work and went to sleep.

The Prah fruit is an article of diet of which the Sakai are very fond. This fruit is sometimes roasted whole in the fire, and when so treated is not unpleasant to eat, having a flavour something like a Brazil-nut. It is also beaten to a flour in a large wooden mortar of exactly the same type as the Malay *lesong*. The fruits when freshly gathered are said to be poisonous to a certain extent, and are soaked in water before use. Noting that several side-paths branched off from the main Sakai track, which follows the Kinta River, I enquired where these went. My coolies replied that they led to parts of the jungle where there were numbers of Prah trees, and that they built small huts near the trees in which they stored the ripe fruit. These store-houses, except at the fruit season, were only visited occasionally to obtain fresh supplies or to see if rats were eating their contents. If it was found that there were many rats about, snares were set for a night or so in order to trap them for food.

Some cobs of Indian corn, most of them blackened by smoke, were hung up under the thatch in the communal house at Bukit Daroh. These were reserved for seed purposes, as were also some dried tobacco-plant fruits. The Sakai explained to me that they had no tobacco growing at the time of my visit owing to their clearing being old, for tobacco only grows well on fresh soil.

With regard to their appearance the people of the Ulu Kinta in their features showed little, if any, traces of Negrito admixture. Curly, but not woolly, hair was to be observed in some individuals. The septum of the nose was bored in both sexes, but by no means every native had been operated upon.

Tattooing is practised, but not to any great extent; the only type of marking of this kind which I saw (on both men and women), being a single line running perpendicularly from the top of the forehead to either the root or the point of the nose.

Face-painting in simple designs was much in favour among the women, while some of the patterns were made by applying a kind of plant juice with stamps made of tortoise-shell.

I saw very few blow-pipes in the hands of the Kinta Sakai, not more than four altogether, and of these only two

were made locally. Of the other two, one had been purchased from a "Kampong Kelantan man" (on the Kelantan border?), the other from a wandering aborigine from some unknown district. The weapons, however, presented some peculiarities worth noting, as they were, roughly speaking, intermediate in type between those used by the main branches of the Northern and Central Sakai. All the blow-pipes had the flat-ended mouth-piece of the Central Sakai, but the inner tube in three out of the four was a single internode of bamboo (Northern Sakai type); in the remaining specimen, however, which was locally made, it consisted of two internodes placed end to end and fastened in the usual manner employed by the Central Sakai. The only locally made quiver that I saw had a soft pandanus cover of the type so common in the Batang District of Perak. The quiver belonging to the "Kampong Kelantan" blow-pipe had a hard cover of the Northern Sakai variety.

The two poisons used on the blow-pipe darts are Ipoh and Broyal*, the latter which is obtained from a liana, is only used for small game, and is, the Sakai told me, much less effective than Ipoh. Darts treated with Broyal are not notched above the poison (so that the dart joint may break off in the wound); those treated with Ipoh are.

Spears, with a bamboo blade and a wooden shaft, are used in spring-traps, and a number of these were placed across the rafters of the communal house at Bukit Daroh. With the exception of the blow-pipe, iron-bladed spears of Malay manufacture, kris, parangs, and daggers of the kind called *tumbuk lada* and *badek* were the only weapons in use.

On questioning the Sakai, they said they had heard of the bow, which is used by the Negritos and the hill-tribes of the Piah and Temengoh Valleys, but had never seen a specimen.

A fair number of dogs are kept by the Kinta aborigines, while generally speaking they are well treated and a good deal of affection shown to them.

Of the objects that I collected the most interesting were the face-paint stamps, and wooden combs of various types, some of which seem to be peculiar to the district, and are almost exactly similar to those figured by De Morgan in his "Negritos de la Presqu'île Malaise."

Two holders used for fish-bait, consisting of open bamboo receptacles, with a spike from their bases (this spike being for securing the holder on the left side of the body by slipping it into the girdle), are of a kind also figured by de Morgan with the description "Boîtes à amorces de pêche," and by Skcat (Pagan Races, vol. I, page 471) as "Bamboo vessels used by Perak Sakai (Hale collection)." I also procured several specimens of seed necklaces, carrying baskets, bark-cloth, headbands (ornamented with patterns), *akar batu* girdles and

* The Prual of Wray (*Coptosapella flavescens*)? vide "Pagan Races" vol. II, page 303.

necklets, flutes, * and rice bags, but they do not call for special remark, being similar to those manufactured by other tribes. The coloured crown-like head-dresses, made of sweet smelling leaves and fibres, worn by some of the men are, perhaps, worthy of note, as they resemble those made by the Sakai of the Piah and Temengoh Valleys.

BELIEFS AND CUSTOMS.

I could obtain no evidence that the Sakai of the Kinta Valley have any theory of a Supreme Being, nor was I able to find out that they had any legends accounting for the various phenomena of nature, as have most savage tribes, but I give below such details as I learnt with regard to their beliefs and customs.

WORK TABUS.

It is according to Udah, my informant, not allowable to do work in the clearing when:—

1. The moon falls at the rising of the sun—three days tabu.
2. The moon is at the full and looks swelled—three days tabu. (It is said to be about to give birth).
3. The moon is beginning to decline and is “notched like a reaping knife”—three days tabu. (It has given birth).
4. The old moon is about to die—(two days tabu).
5. The new moon appears—(two days tabu).

If work is done when the new moon is about to die, somebody in the house will die. If work is done at the new moon, pigs will come and damage the crops.

It is tabu to cut rattans at the edge of a clearing in which padi is planted.

TABUS CONNECTED WITH FOOD:

The flesh of the following animals is forbidden to women and it is thought that the breaking of the tabu would cause the children to suffer from convulsions. Some laxity of observance, however, with regard to these customs seems to be creeping in; and it is a matter for the woman herself whether she observes all, or any, of the prohibitions.

The Muntjac.

The species of tortoise called *Baning* by the Malays.

The Mouse deer.

The Rusa deer (tabu not observed by all women).

The Fowl.

It is not customary for the Sakai to eat fowls reared in their own village, though they will consume birds bought from outsiders, provided that they have not been kept in the village for a day or two. They told me that the reason for this was

* The nose-flute does not seem to be known in this district.

that they had pity on animals which they had brought up themselves. Double bananas are not eaten by the women, since they think that to do so would cause them to have twins. Twins do not seem to be welcomed, the reason being, the Sakai said, that one of them always died.

Peppers may not be eaten with the flesh of birds or animals, as, if this is done, traps set in the jungle will catch no game. This prohibition does not, however, apply to fish.

Among the Kinta Sakai it is tabu for the usual names of certain animals to be mentioned while their flesh is being eaten. Curiously enough, it is not forbidden to mention their names while out hunting them. Below I give the English, ordinary Sakai, and Sakai tabu names of some of these:—

| ENGLISH NAME. | ORDINARY SAKAI NAME. | TABU NAME. |
|----------------------------------|----------------------------------|--|
| Bamboo rat. | <i>Takator</i> or <i>Dekak</i> . | <i>Nyam awin</i> (i.e. bamboo meat). |
| Fowl. | <i>Manuk</i> . | <i>Chep</i> (bird). |
| Brok monkey. | <i>Dok</i> or <i>Dog</i> . | <i>Hoi-wet</i> or <i>Hoi-ket</i> (said to mean "no tail.") |
| A Monkey (<i>Hylobates</i> sp.) | <i>Senalu</i> . | <i>Bersentak</i> (i.e. the tailed one). |
| Muntjac. | <i>Jet</i> . | <i>Penyel</i> (said to mean "red.") |
| Mouse deer. | <i>Bichok</i> . | <i>Reluk</i> (said to mean "big eyes.") |
| Sambhur. | <i>Tata-jeruk</i> . | <i>Nyam</i> . (meat. Equivalent to the Malay word <i>lauk</i>). |
| Wild pig. | <i>Heyhak</i> . | <i>Amboit</i> . |
| Porcupine. | <i>Chekos</i> . | <i>Bejalak</i> (i.e. the thorny one). |
| Bear. | <i>Ta'pus</i> . | <i>Mes-mat</i> (small eyes). |
| Rhinoceros. | <i>Tata-guru</i> . | <i>Tata-menu</i> . |

If a man, in cutting up the flesh of an animal, which has a tabu name, wounds his hand, he must not leave the house for four days, or he will be eaten by a tiger.

The Ulu Kinta Sakai, as do the Temengoh people, believe in the bad luck which will pursue anyone who goes out with an unsatisfied craving of any kind, and they also apply to this belief the word *shelentap* or *shalantap*, which is difficult to translate, but is seemingly equivalent to the Malay *kempunan*. One Sakai with whom I had been talking about this matter, having been given a couple of biscuits shortly afterwards, went round among his companions, who were squatting near my tent, and, chiefly, I think, with the idea of giving me a practical

demonstration, broke off a bit of biscuit for each man, saying as he gave it to him "*shulantap*." Apart from greediness, I am inclined to believe that some idea of this kind may be the reason why, if one Sakai is given something to eat, all the others expect to receive a little too, even if they see that your stock of that particular article is almost exhausted.

I could not find out that the Kinta Sakai have any name for fish in general, but the word *kak* (commonly used for "fish" by other tribes) is applied to the *Tengas*, about the only species which is common in the head waters of the Kinta. The *Sebaran*, the *Haruan* and others are not recognised as *kak*. While fishing for *Tengas*, or while it is being eaten, its name *kak* must not be mentioned, but the Malay word *ikan* (fish) used instead.

While tabu food of any kind is being eaten, lice may not be cracked, nor hair burnt in the fire. The breaking of this prohibition would entail the penalty of the offender being seized by a tiger.

OTHER TABUS.

It is tabu for a man, on leaving a friend's house, to promise to return to sleep there, and then neglect to do so. If he does not keep his promise, his friend will be taken by a tiger.

It is tabu for a man to stop behind after promising some friends to go on a journey with them. If he does so, his friends will fall ill by the way.

It is forbidden to a man to mention the names of his father, his mother, or his mother-in-law. A mother-in-law may not be spoken to, touched or even passed by, unless at a distance. Similarly a woman must avoid her father-in-law.

MARRIAGE CUSTOMS.

I was given to understand that first cousins might not marry, but that first cousins once removed might do so. Two wives were said to be allowable, but not three. A man usually takes a wife from another settlement. After marriage the man lives with his wife's family for some time.

BURIAL CUSTOMS.

Though I had no opportunity of visiting a Sakai interment, some rather interesting information with regard to burial customs was given me by the headman, Udah. He told me that graves were dug to about a depth of a foot more than the height of a sitting figure (so that the spirit or corpse may be able to sit up); and that the body is placed at the bottom of the excavation, lying with the head in the direction in which it was when death occurred, the orientation of the grave being of course such as to render this possible. The hole is covered in with a roofing, which is almost on a level with the surface of the ground, while the earth from the excavation is piled up on this, the mound being topped by a hut of some

sort. Food is placed at the grave, and a fire is lit there for seven consecutive mornings. The belongings of the deceased are placed either in or on the grave, and are purposely damaged (probably in order to set free the souls of the articles for the dead man's use) before so disposing of them; a blow-pipe for instance being broken in the middle, and a dart-quiver split down one side. I asked Uдах for an explanation of this custom, and he replied, that if they put an adze in good condition on the grave, it would look bent or crooked to the ghost of the dead man, but if they put one that was bent or broken there, it appeared straight to the spirit.

A death necessitates the desertion of the settlement, but the Sakai are not afraid to return to the clearing in the day-time to get the produce of any crops which may be growing there.

VOCABULARIES.

I give below a vocabulary obtained from a Sakai of the Ulu Kinta; and with it, for purposes of comparison, another taken by myself in 1915 from a "Hill Sakai" of the Temengoh District. With regard to the Kinta vocabulary, it is rather curious that, while I could obtain no word for "animal," there is one, *tata*, which is used of large animals only. Furthermore, two of the animals to which this word is applied have names which denote their peculiarities. Thus the Sambhur is called *Tata-jeruk*, *jeruk* meaning "long" or "far," from the fact that it has long legs, while the Bear, which the Sakai tell me is very fond of tepus fruits, is named *Ta'pus* or *Ta'apus*, a contraction for *Tata'tepus*. There is, I find, on comparing the two vocabularies, some confusion in the terms employed for denoting various relationships. For instance, the words given to me by the Ulu Kinta Sakai for "husband" and "wife" were *touh** and *leh*, while in the Ulu Temengoh vocabulary the order is reversed. I have entirely omitted several relationship terms, in which there seem to be inconsistencies. Sen-oi is the word used by the Kinta aborigines to denote men in general (homines) and they gave me the following examples of its use:—

Sen-oi Gop, A Malay.
Sen-oi Begyek, An European.
Sen-oi Beg, A Sakai.

| <i>English.</i> | <i>Malay.</i> | <i>Sakai U. Kinta.</i> | <i>Sakai Bukit (U. Temengoh.)</i> |
|-----------------|---------------|------------------------|---------------------------------------|
| Head | ... Kepala | ... Kuie | ... Koie |
| Ear | ... Telinga | ... Gentok | ... Gentog |
| Eye | ... Mata | ... Mat | ... Mat |
| Nose | ... Hidong | ... Mühr | ... Muh |
| Nostril | ... Lubang | hid- Lubang muhr | Umok muh |
| | ong. | | |

* In the comparative vocabulary "Pagan Races" *tou* is given as a word for "Male" obtained from a Tanjong Rambutan Sakai.

| <i>English.</i> | <i>Malay.</i> | <i>Sakai U. Kinta.</i> | <i>Sakai Bukit (U. Temengoh.)</i> |
|-----------------|-------------------|------------------------|---|
| Cheek | ... Pipi | ... Kapok | ... Kapok |
| Mouth | ... Mulut | ... Nyark | ... Nyug |
| Lip | ... Bibir | ... Sentor | ... Lentag |
| Tongue | ... Lidah | ... Lentak | ... Leheng |
| Tooth | ... Gigi | ... Moin | ... Lemoin |
| Chin | ... Daggu | ... Chakak | ... Yakak |
| Neck | ... Lihir | ... Geloh | ... Geloh |
| Throat | ... Tengkok | ... Tangun | ... Tangurn |
| Shoulder | ... Bahu | ... Yung | ... Pog |
| Arm | ... Lengan | ... Sapal | ... Sapal |
| Elbow | ... Siku | ... Kanyong | ... Kanyong |
| Hand | ... Tangan | ... Tig | ... Ting |
| Thumb | ... Ibu tangan | ... Tabok tig | ... Tabok |
| Finger | ... Jari | ... Jari | ... Jari |
| Finger-nail | ... Kuku | ... Cheros | ... Chendros |
| Thigh | ... Paha | ... Beluk | ... Blik |
| Knee | ... Lutut | ... Karol | ... Karol |
| Shin | ... Tulang kering | ... Kemong | ... Kemong |
| Foot | ... Kaki | ... Juk | ... Kapar |
| Heel | ... Tumit | ... Deldul | ... Deldul |
| Sole | ... Tapak kaki | ... Tapar juk | ... Juk tapar |
| Toe | ... Jari kaki | ... Jari juk | ... Juk |
| Breast | ... Dada | ... Dar-heuk | ... Dadak |
| Back | ... Belakang | ... Keruk | ... Kreuk |
| Heart | ... Jantung hati | ... Hup | ... Bod |
| Liver | ... Hati | ... Hinum | ... Hug |
| Stomach | ... Perut | ... Eg | ... Aig |
| Navel | ... Pusat | ... Panik | ... Panig |
| Intestines | ... Isi perut | ..... | Wak |
| Blood | ... Darah | ... Lot | ... Lorn |
| Bone | ... Tulang | ... Tunleng | ... Jeharng |
| Skin | ... Kulit | ... Sempok | ... Sempok |
| Hair | ... Rambut | ... Suk | ... Shug |
| Old | ... Tua | ... Tatah | ... Tatak, Kebid |
| Young | ... Muda | ... Litong | ... Patun |
| Fat | ... Gemok | ... Menung | ... Chekeng |
| Thin | ... Kurus | ... Suak | ... Na-semog |
| Hot | ... Panas | ... Büt | ... Būd |
| Cold | ... Sejuk | ... Dekat | ... Dekad |
| Blind | ... Buta | ... M | ... Hoi-chung |
| Deaf | ... Tuli | ... M | ... Hoi ta begen- tog (deaf man). |
| Dumb | ... Bisu | ... M | ... Langau |
| Fever | ... Demam | ... Gik | ... Najeh |
| Itch | ... Kurap, Kudis | ... Gas, kudil | ... Gas, choid |
| Vomit | ... Muntah | ... Kok | ... Koh |
| Gripes | ... Sakit perut | ... Pedik eg | ... Kab-ig |
| Diarrhoea | ... Chirit | ... Imharp | ... Naham |

| <i>English.</i> | <i>Malay.</i> | <i>Sakai U. Kinta.</i> | <i>Sakai Bukit (U. Temengoh).</i> |
|-----------------|------------------------------|------------------------|---------------------------------------|
| Cough | ... Batok | ... Suwad | ... Sengod |
| Dead | ... Mati | ... Kebus | ... Kebus |
| Putrid | ... Busok | ... Soh | ... Sashok |
| Father | ... Bapa | ... .. | Benk |
| Mother | ... Ibu | ... Boh | .. Nyok |
| Husband | ... Laki suami | ... Touh | ... .. |
| Wife | ... Bini | ... Leh | ... .. |
| Male | ... Jantan | ... Baber | ... Baber |
| Female | ... Betina | ... Babok | ... Babok |
| Man | ... Orang laki-laki. | Touh | ... .. |
| Women | ... Orang perempuan. | Babok | ... Babok |
| Person | ... Orang | ... Sen-oi | ... Senoi |
| Son | ... Anak laki-laki | Kuod baber | ... Kungis |
| Daughter | ... Anak perempuan. | Kuod babok | ... Kuod babok |
| Child | ... Kanak kanak | Bong (f) atong (m) | Kuod |
| Boy | ... Budak laki laki | Atong | ... Kungis |
| Girl | ... Budak perempuan. | Aleh | ... Kuod babok |
| Maiden | ... Anak dara | ... Menaleh | .. Kumon |
| Elder brother | Abang | ... Keluh | ... Kelok |
| Elephant | ... Gajah | ... Tata-gas | ... Tangel |
| Rhinoceros | ... Badak | ... Tata-guru | ... Hagap |
| Tapir | ... Tenok, badak tampong. | ..... | Barong |
| Gaur | ... Seladang | ... Sapi? | ... Sapi |
| Bear | ... Beruang | ... Ta-apus | ... Kauib |
| Deer | ... Rusa | ... Tata-jeruk | ... Seig |
| Chevrotain | .. Napoh, plan-dok. | Napoh, bichok | Bechog |
| Wild pig | ... Babi hutan | ... Heykak | ... Amboid |
| Porcupine | ... Landak | ... Chekos | ... Lanug |
| Dog | ... Anjing | ... Chuok | ... Chuok |
| Wild dog | ... Anjing serigala | Chuok meng- ok. | Mengkong |
| Tiger | ... Harimau | ... Marmuk | ... Mamu |
| Black panther | Harimau kum- bang. | Marmukr | ... Baling |
| Wild cat | ... Kuching hutan | Semagar | ... Jet-ung |
| Cat | ... Kuching | ... Kuching | ... Had kuching, cheuchog. |
| Bear-cat | ... Benturong | ... .. | Tenuk |
| Civet-cat | ... Musang | ... Rengher | ... Kenrog |
| Large squirrel | Tupai nand- ong, kerewak. | Kraleh | ... Kedig (?) |
| Small squirrel | Tupai kam- pong. | Rengnain | ... Achoh |

| <i>English.</i> | <i>Malay.</i> | <i>Sakai U. Kinta.</i> | <i>Sakai Bukit (U. Temengoh.)</i> |
|------------------------|-----------------------------|------------------------|---------------------------------------|
| Flying lemur | Kubong | .. Ampak | ... Anchong |
| Loris | ... Kongkang, kera duku. | Kelpem | ... Kayi |
| Bamboo rat | ... Dekan | ... Takat | ... Hayum |
| Rat | ... Tikus | ... Kedig | ... Kenon |
| Gibbon | ... Unka | ... .. | Legrub |
| Monkey | ... Lotong | ... Besik | ... Shenalu |
| " | ... Kera | ... Areit | ... Jerau |
| " | ... Berok | ... Dok | ... Apong |
| Fruit-bat | ... Keluang | ... Kaweid | ... Kaweid |
| Bat | ... Kelawar | ... Taper | ... Taper |
| Crocodile | ... Buaya | ... Bahaya | ... Buayar |
| Monitor-lizard | Biawak | ... Parik | ... Gre-ek |
| Grass-lizard | ... Bengkarong | ... Tarok | ... Payard |
| Flying-lizard | Chichak kubin | Hanok | ... Tarong |
| Land-tortoise | Kura-kura, baning. | Kura, sil, kenok | Karuak kenog |
| Water-tortoise | Labi-labi | ... Pa-as | ... Pa-ash |
| Snake | ... Ular | ... Tajuk | ... Tajuk |
| Python | ... Ular sawah | ... .. | Telud |
| Frog | ... Katak | ... Sek-nuk | ... Changkei |
| Fish | ... Ikan | ... Kak (?) | ... Kak |
| Horn | .. Tandok | ... Balok | ... Balok |
| Tusk of Ele- phant. | Gading | ... Balok (?) | ... Geneh |
| Tail | ... Ekor | ... Sentak | ... Sentak |
| Hornbill | ... Enggang | ... Tērūk | ... Halang |
| Hawk, eagle | ... Lang | ... 'Hlak | ... Klang |
| Owl | ... Burong hantu | Huhui | .. Huhui |
| Egret | ... Bangau | ... .. | ... .. |
| Jungle-fowl | ... Ayam denak | ... Manuk denak | Tadur, sieng |
| Argus-pheasant. | Kuao-kuang | ... Kuak | ... Kuang |
| Green-pigeon | Punai | ... Punai | ... Chechib |
| Crow | ... Gagak | ... Ekark | ... Agak |
| Kingfisher | ... Pekakak raja udang | Pekakak | ... Burau |
| Woodpecker | ... Pelatok | ... Pelatok | ... Tahmar |
| Magpie-robin | ... Murai | ... Birai | ... Birai |
| Egg | ... Telur | ... Tap | ... Tab |
| Feather | ... Bulu ayam | ... Sentol manuk | Shog manok |
| Beak | ... Paroh | ... Balok | ... Balog, che- nong. |
| Ant | ... Semut | ... Bet | ... Kavid |
| Red ant | ... Kerungga | ... Lauer | ... Garud |
| White ant | ... Anai-anai | ... Bubok (?) | ... Kated |
| Bee | ... Lebah | ... Padou | ... Padou |
| Honey | ... Ayer madu | ... Dengkui | ... Dingkui |
| Wax | ... Lilin | ... Kaluoi | ... Shud |
| Hornet | ... Terbuan | ... Jenjak | ... Langir |

| <i>English.</i> | <i>Malay.</i> | <i>Sakai U. Kinta.</i> | <i>Sakai Bukit (U. Temengoh).</i> |
|------------------|-----------------|---|---|
| Wasp ... | Penyengat ... | Rejau, huk ... | Jenjug |
| Fly ... | Lalat ... | Ruoi ... | Ruoi |
| Black scorpion | Kala ... | Mangai ... | Jungei |
| Small scorpion | Kala jengking | Slerdor ... | Engchesh |
| Centipede ... | Lipan ... | Kehep ... | Keheb |
| Millipede ... | Sepak bulan ... | Tanglung ... | Talei |
| Cockroach ... | Lipas ... | Garip, ser ... | Chelapog |
| Spider ... | Labah-labah ... | Geng-ong ... | Krelbol |
| Cocoanut beetle. | Kumbang ... | Gintus ... | Tawing |
| Mosquito ... | Nyamok ... | Sebik ... | Kebok |
| Tree ... | Pokok kayu ... | Bo'jehuk ... | Jehuk |
| Bough .. | Dahan ... | Chempark jehuk. | Tabak |
| Root ... | Akar pokok .. | Latong ... | Tengteng |
| Leaf ... | Daun Kayu .. | Selat jehuk ... | Shelak |
| Flower ... | Bunga ... | Bungar ... | M |
| Fruit ... | Buah kayu ... | Keburk jehuk | Kebuk |
| Fungus ... | Chenduan ... | Buhr ... | Bur (kuling, fungus on tree trunks) |
| Bamboo ... | Buloh, aur ... | Awin kelol, awin temark (near water) awin suor (B. wrayi). | Awin |
| Rattan ... | Rotan ... | Tali ... | Tali |
| Thorn ... | Duri ... | Jalak ... | Jalak |
| Rice ... | Padi ... | Bah ... | Bah |
| " ... | Beras ... | Cheroi ... | Beras, kok. |
| " ... | Nasi ... | Chanak ... | Chenin |
| Banana ... | Pisang ... | Teluie ... | Telui |
| Areca-nut ... | Pinang ... | Jerok ... | M |
| Durian ... | Durian ... | Sempak ... | Penrug |
| Tampoi ... | Tampui ... | Tampoie ... | Tampoi |
| Rambutan ... | Rambutan ... | Susuk ... | Lichag |
| Sireh-leaf ... | Daun sireh ... | Sireh ... | Sireh biad |
| Screw-palm ... | Mengkuang ... | Salek ... | Budap |
| Terap-tree ... | Terap ... | Hah-uk ... | Ued |
| Forest ... | Hutan ... | Mabek ... | Cherog |
| Yam ... | Ubi kayu ... | Kuoi ... | Had ubi |
| " ... | Keledek ... | Seung ... | Gak |
| " ... | Keladi ... | Gong ... | Berak |
| To walk ... | Berjalan ... | Chep-chib ... | Chib |
| " run ... | Lari ... | Dedūk ... | Dadok |
| " stand ... | Berdiri ... | Tetut ... | Tud |
| " sit ... | Dudok ... | Gel-gul ... | Gul |
| " lie down ... | Berbaring ... | M'adat ... | Wog |
| " sleep ... | Tidor ... | Sek-lok ... | Shelog |

| <i>English.</i> | <i>Malay.</i> | <i>Sakai U. Kinta.</i> | <i>Sakai Bukit. (U. Temengoh).</i> |
|-----------------|------------------------|-------------------------|--|
| To snore | ... Berdengkor | ... Hinum | ... Kenekug |
| „ jump | ... Melompat | ... M | ... Panchar |
| „ climb | ... Menjat | ... Ek-oit | ... Oig |
| „ hold | ... Pegang | ... Kuop | ... Kwob |
| „ lift up | ... Angkat | ... Beuk | ... Angkid |
| „ throw | ... Lempar, lontor. | ? | Pekah |
| „ scratch | ... Garu | ... Gesh-gish | ... Gish |
| „ spit | ... Ludah | ... Gentok | ... Getok |
| „ bite | ... Gigit | ... Nakap, kap | ... Kop |
| „ pinch | ... Chubit | ... Pinyet | ... Cheket |
| „ wash | ... Basoh | ... Sūd | ... Re-ed |
| „ bathe | ... Mandi | ... Mahmud, mehmu. | Mamuh |
| „ cook | ... Memasak | ... Meched, berched. | Chet |
| „ eat | ... Makan | .. Chechak | ... Chak |
| „ drink | ... Minum | ... Imoh | ... Ong |
| „ chew | ... Mamah | ... Beus | ... Die |
| „ fly | ... Terbang | ... Nahek | ... Heng |
| Sun | ... Mata hari | ... Mat-ish | ... Mad-ish |
| Moon | ... Bulan | ... Gechek | ... Gechek |
| Star | ... Bintang | ... Peloie | ... Perloie |
| Cloud | ... Awan | ... Ol | ... Sagub |
| Mountain | ... Gunung | ... Jelmol | ... Jelmol |
| Hill | ... Bukit | ... Tenuh | ... Gerbok |
| Day | ... Siang | ... Nayah | ... Jemiah |
| Night | ... Malam | ... Laiyek | ... Laiëg |
| Thunder | ... Guroh, petir | ... Brehelak | ... Engkup |
| Wind | ... Angin | ... Nahul | ... Jerop |
| Rain | ... Hujan | ... Natur | ... Natur |
| Storm | ... Ribut | ... Sagup | ... Kabut |
| Fire | ... Api | ... Us | ... Qs |
| Water | ... Ayer | ... Ong | ... Teu |
| Smoke | ... Asap | ... Per-ut | ... Pengud |
| One | ... Satu | ... Nek | ... Neh (do-nek 1st) |
| Two | ... Dua | ... Nar | ... Nar (do-nar 2nd) |
| Three | ... Tiga | ... Nek | ... Nek |
| Four | ... Ampat | ... M | ... Lebeh |
| Five | ... Lima | ... M | ... Tabok |
| Ashes | ... Abu | ... M | ... Ual |
| Salt | ... Garam | ... M | ... Empoid |
| Tobacco | ... Tembakau | ... Akau | ... Akau |
| Stone | ... Batu | ... M | ... M |
| Earth | ... Tanah | ... Teh | ... Teh |
| A clearing | ... Ladang | ... Slai | ... Shelai |

| <i>English.</i> | <i>Malay.</i> | <i>Sakai U. Kinta.</i> | <i>Sakai Bukit (U. Temengoh.)</i> |
|-----------------|----------------------------|------------------------|---|
| House | ... Rumah, pondok. | Dik, dingrup | Dig |
| Roof | ... Atap rumah | ... Kenrob, dik | ... Kenrob |
| Chopper | ... Parang | ... Woit | ... Joh-oid |
| Axe | ... Kapak, beliong. | M | ... Kapok, jek |
| Knife | ... Pisau | ... M | ... ? |
| Cloth | ... Kain | ... Abat | ... Abat |
| Girdle | ... Gendit, kendit | Gendit | ... ? |
| Spear | ... Lembing | ... Bulus | ... Bulus |
| Blow-pipe | ... Sumpitan | ... Blau | ... Blau |
| Mouthpiece | ... Pngkal sumpitan. | Tebog blau | ... Tebul blau |
| Muzzle | ... Mata sumpitan. | Penisuis blau | Shoi |
| Quiver | ... Tabong bekas damak. | Luk | ... Luk |
| Quiver cords | Tali tabong | ... Tig luk | ... Chenrai luk |
| Dart | ... Damak | ... Rok | ... Shigar |
| Point of dart | Mata damak | ... Soie Rok | ... Shoi shigar |
| Butt of dart | ... Pangkal damak. | Basok rok | ... Pashug shigar |
| Dart holder | ... Sarong damak | Saret rok | ... Not used, sometimes small tubes of darts |
| Poison | ... Ipoh | ... Pelai menut | ... Dog |

XI. ON A NEW RACE OF CALLOSCIURUS ATRODORSALIS (GRAY) FROM NORTH SIAM.

By H. C. ROBINSON & R. C. WROUGHTON.

CALLOSCIURUS ATRODORSALIS ZIMMEENSIS, *subsp. nov.*

Type: Adult female (skin and skull), British Museum No. 9, 10, 11, 20. Collected at Chiangmai, North Siam, on 12th April 1908 by Mr. T. H. Lyle and presented to the National Museum. Collector's Number 245.

Diagnosis. A local form of *C. atrodorsalis*, in which the dorsal patch is almost obsolete and the rufous undersurface broken by a patch, coloured like the back, on the throat, chest and a narrowing area of the abdomen.

Colour. General colour above the usual olivaceous grizzle, the dorsal black patch almost obsolete; below the throat, chest and a wedged shaped area, extending to at least half the length of the abdomen coloured like the flanks, the remainder nearly hazel. Face like back with no trace of the bright colouring so characteristic of typical *C. a. atrodorsalis*. Hands and feet finely grizzled, at least as dark as the back. Tail rather as in *C. caniceps concolor* than in *C. atrodorsalis*, i.e. the fulvous shading of the hairs so common in the latter almost entirely absent in this form.

Dimensions. External dimensions of the type, taken in the flesh; head and body, 217; tail, 205; hindfoot, 49; ear, 21mm.

Skull: Greatest length, 55; basilar length, 42; zygomatic breadth, 32; nasals 17; diastema, 12; upper-molar series, 10.6mm.

Remarks. A fine series of 12 specimens, all with one exception taken between 700 and 1,000 feet in altitude, is quite constant in showing the obsolescence of the black dorsal patch and equally so in the encroachment of the dorsal colouring on the throat, chest and anterior abdomen. An individual taken at Muang Pai on the Salwin watershed shows intergradation with other forms from British Burma.

XII. ON TWO LITTLE-KNOWN RATS FROM WESTERN JAVA.

By H. C. ROBINSON, C.M.Z.S.

Owing to the fact that the work of Mr. Shortridge, the only modern collector of mammals in Java (*vide* P.Z.S. 1909 (i), pp. 371, et seq.) was mainly confined to the lowlands and to cultivated districts, but little trapping having apparently been carried out in heavy jungle our knowledge of the murine fauna of Java, with the exception of the forms parasitic on man is almost entirely derived from scattered notices by Dr. Jentink in the "Notes of the Leyden Museum," while his descriptions being generally founded on ancient and imperfect specimens and not conforming to modern standards, render it somewhat difficult to identify the species intended by him.

During a recent visit to Java I succeeded in the course of a month's stay on the Gedeh Volcano in the Preanger Regencies, at a height of from 4,500 to 8,000 feet, in trapping several hundred rats, belonging to seven species, all of which, with the exception of a series of *R. concolor* obtained in the immediate vicinity of native houses were secured in primæval jungle.

Four of these species will be described in the forthcoming paper on the Mammals of our Korinchi Expedition, being closely allied to new forms from Sumatra.

The remaining two species have already been described by Jentink but I think it well to redescribe them here in view of the paucity and age of his material.

RATTUS LEPTURUS (JENT.).

Mus lepturus, Jentink, Notes Leyden Mus. ii. p. 17 (1879). ("Java" ex Temminck M.SS.)

Form slender, tail very much longer than head and body. Pelage very long, soft and woolly, entirely devoid of spines. Ear very large, rounded. Skull with small but globose bullæ. Tooth row exceptionally long, the teeth large.

Fur composed of two elements only, viz. long and very fine piles most abundant on the rump, extending almost to the nape but practically absent on the sides and the ordinary underfur, which is very long and soft, sooty grey at the base and fulvescent buff at the tip, the flanks, and sides of the neck brighter, cinnameous buff. Top of the head and periocular region a fine speckle of wood-brown, buff and black with grey bases, hands and feet greyish white with brown median streak: vibrissæ black, a few white at the base. Underparts pure creamy white to the base of the fur. No buff gorget or median stripe on the belly. Tail very finely ringed, slightly

pencilate at the tip, blackish at base above, whitish beneath, the distal third whitish above also. Ears extremely finely haired, almost naked.

Skull:—Except for the large size of the teeth there is nothing especially peculiar about the skull. It is lightly built and even in very aged specimens not heavily ridged, nor does it present the marked cranial flattening present in rats of the *surifer* group. Nasals are slender, pointed posteriorly and extend up to or beyond the maxillary suture. Mesopterygoid space markedly horse-shoe shaped, the palatal foramina long, extending behind the roots of the anterior molars. Ante orbital plate broad, projecting slightly forwards, zygomata slender. Bullæ small but not flattened.

Specimens examined:—Over sixty of all ages.

Measurements:—For detailed measurements see pp. 96, 97.

This pretty rat was extremely abundant on the Gedeh and Pangerango at high elevations, becoming scarce below about 5,600 feet. It was seen throughout the day and at Kandang Badak no trap remained set for more than a very few minutes.

In the crater of the Gedeh it was observed in numbers feeding on the pods of a leguminous tree (*Pithecolobium*).

Remarks:—This species belongs to a group of which the following can be stated to be members, though the section probably contains other Chinese forms regarding which we are not in a position to make any remarks. From comparison with the type the present form is closest to *R. brahma* (Thos).

1. *Mus fulvescens*, Gray, Cat. Mamm. etc. Nepal and Tibet B.M. (1). p. 18 (1846). Nepal.
2. *Epimys cha*, Wroughton, Journ. Nat. Hist. Soc. Bombay, xxiv, p. 420 (1916). Sikkim (8,800 feet.)
3. *Epimys lepcha*, Wroughton, loc. cit. supra, p. 428. Sikkim (5,350 feet.)
4. *Rattus blythi*, Kloss, Records Indian Mus. xiii, p. 8 (1917). (*Mus cinnamomeus*, Blyth nec Pictet.) Shwegyin, Tenasserim.
5. *Epimys brahma*, Thomas, Journ. Nat. Hist. Soc. Bombay, xxiii, p. 231 (1914).

Anzong Valley, Mishmi Hills.

The following are more distantly related and possibly form a connecting link between this group and the *cremori-venter* section.

6. *Epimys gracilis*, Miller, Smithsonian Misc. Coll. vol. 61, p. 21 (1913). Mount Muleyit, Tenasserim.
7. *Epimys solus*, Miller, loc. cit. supra, p. 22. Pulau Terutau, W. Malay Peninsula.
8. *Epimys orbus*, Robinson & Kloss, Ann. & Mag. Nat. Hist. (8) xii, p. 288 (1914). Bandon, N.E. Malay Peninsula.

9. *Epimys fraternus*, Robinson & Kloss, Journ. Straits Branch. Roy. Asiat. Soc. No. 73, p. 273 (1916).
Korinchi, West Sumatra.

In dealing with Oriental rats it has been the fashion to regard the degree of spininess as a constant specific character, almost of subgeneric value, though as Thomas has pointed out this is of no differential value in South American rodents. To a certain extent this also appears to be true of the series listed above, which are essentially mountain rats: *R. lepturus* and *R. brahma* are very woolly rats without a trace of spines. *R. orbus* on the other hand is a very spiny rat. In all however the woolly underfur is well developed. *R. fraternus* is spiny at low elevations but appears to become progressively more woolly as the altitude of its habitat increases.

Possibly additional wool has been developed at the expense of spines in those localities where in addition to the fall in temperature there is a very great increase in humidity, though it is fair to admit that the spiniest local rat, *R. inas* (Bonh.) is exclusively an inhabitant of high levels where the precipitation is presumably high.

RATTUS BARTELSI (Jent.).

Mus bartelsi, Jentink, Notes Leyden Museum XXXIII, p. 69 (1910) (Pangerango, W. Java, 6,000').

Of this species also I collected a very large series from what is practically the type locality. It is an inhabitant of intermediate zones, being rare above 7,000' or below 4,500'.

Jentink's description of this form is quite recognizable except that he states that the ear is short, whereas it is decidedly long for the size of the animal.

Fur of one element only fairly long and extremely dense and soft dark grey at the base tipped with buffy or hazel in some cases almost black on the median line, general effect very variable from almost liver brown to cinnamonaceous. Underparts which are sharply defined from the upper surface equally variable from almost white to dark silvery grey. Head more greyish brown, sides of the neck and shoulders buffy ochraceous.

Feet and hands yellowish white without dark metapodials. Ears long, very finely haired. Tail extremely finely ringed, bicolor, the distal third yellowish white above and below.

Skull:—With no specially distinctive features; nasals decidedly spatulate, palatal foramina shorter and broader than in *lepturus*; mesopterygoid space narrow. Bullae small, slightly flattened and very narrow; ridges in old specimens fairly pronounced. Teeth very small. Anteorbital plate sloping strongly forwards.

Specimens examined:—Sixty-five, of all ages.

Measurements:—For detailed measurements see pp. 98, 99.

Remarks:—I am unable for the present to refer this rat to any group. In some respects it resembles *R. inas* except for its entire absence of spines.

MEASUREMENTS OF Rats from Western Java in mm.

| Rattus lepturus (Jent.) Sex | Body | | | Ear | SKULL | | | | | | | REMARKS | | |
|--------------------------------------|---------------|------|-----------|------|-----------------|-------------------------|--------------------|-------------------|------------------|--------------|--------------------|---------|-----------|------|
| | Head and Body | Tail | Hind foot | | Greatest length | Condylar basilar length | Diameter of sterna | Zygomatic breadth | Length of nasals | Upper molars | Condition of teeth | | F M S No | |
| Kandang Badak, Gedeh, W Java, 7,900' | ♂ | 145 | 211 | 30.5 | 26 | 37.9 | 31.9 | 10 | 17.2 | 13.0 | 7.0 | 84/16 | Adult | |
| | ♀ | 143 | 215 | 31 | 25 | 37.7 | 33.0 | 9.3 | 17.9 | 14.5 | 7.0 | 76/16 | " | |
| | ♂ | 143 | 215 | 31 | 25.5 | 38.5 | 33.2 | 9.9 | 17.7 | 14.2 | 7.0 | 74/16 | " | |
| | ♂ | 150 | 227 | 31 | 25 | 37.5 | 32 | 10.0 | 16.9 | 13.3 | 7.1 | 91/16 | " | aged |
| | ♂ | 135 | 210 | 28 | 24 | 35.1 | 30.2 | 9.1 | 15.7 | 12.2 | 6.9 | 73/16 | " | |
| | ♂ | 154 | 207+ | 31 | 25 | 37.6 | 32.0 | 9.6 | 17.8 | 13.5 | 7.0 | 77/16 | " | |
| | ♀ | 155 | 225 | 31 | 26 | 37.0 | 32.0 | 9.3 | 17.2 | 13.7 | 7.0 | 79/16 | " | |
| | ♂ | 154 | 217 | 28 | 24 | 38.0 | 31.8 | 9.1 | 16.8 | 13.9 | 7.1 | 72/16 | " | |
| | ♂ | 150 | 215 | 31 | 26 | 39.6 | 33.6 | 9.7 | 17.7 | 15.0 | 7.3 | 96/16 | " | |
| | ♂ | 50 | 210 | 31 | 25 | .. | 33.0 | 10.0 | 17.0 | 14.2 | 7.3 | 97/16 | " | |
| Tjibodas Gedeh, W Java 4,500' | ♀ | 142 | 223 | 31 | 24 | 36.3 | 31.0 | 9.3 | 16.5 | 13.9 | 7.0 | 175/16 | " | |
| | ♂ | 137 | 206 | 32 | 24 | 35.7 | 30.2 | 9.0 | 17.0 | 13.0 | 7.0 | 173/16 | " | |
| | ♂ | 150 | 250 | 31 | 25 | 40.0 | 33.0 | 9.9 | 17.6 | 14.2 | 7.2 | 174/16 | " | |
| | ♂ | 139 | 223 | 31 | 26 | 38.6 | 32.8 | 9.2 | 17.2 | 14.0 | 7.1 | 217/16 | " | |
| Kandang Badak, 7,900' | ♂ | 135 | 205 | 31.5 | 25 | 34.0 | 29.7 | 8.4 | 16.0 | 12.8 | 7.1 | 273/16 | " | |
| | ♀ | 139 | 218 | 29 | 26 | 35.2 | 32.8 | 9.7 | 17.3 | 13.8 | 6.9 | 42/16 | Sub Adult | |
| | ♂ | 146 | 235 | 31 | 26 | 35.0 | 32.1 | 10.0 | 17.2 | 14.2 | 7.2 | 244/16 | Adult. | |
| Tjibodas, 5,000' | ♂ | 144 | 237 | 30 | 25 | 39.1 | 32.5 | 9.8 | 17.3 | 13.9 | 7.0 | 44/16 | " | |
| | ♀ | 155 | 226 | 32 | 25.5 | 40.2 | 33.7 | 10.3 | 17.3 | 15.0 | 7.1 | 45/16 | " | |
| | ♀ | 142 | 210 | 31 | 26 | 36.9 | 31.0 | 9.1 | 17.0 | 12.8 | 7.1 | 46/16 | " | |
| | ♀ | 134 | 213 | 31 | 25 | 36.0 | 30.8 | 9.5 | 16.8 | 13.0 | 7.1 | 47/16 | Sub Adult | |
| | ♂ | 131 | 207 | 29.5 | 25.5 | 36.3 | 30.5 | 9.2 | 16.2 | 13.5 | 7.0 | 48/16 | Adult | |
| | ♀ | 146 | 225 | 30.5 | 26 | 37.2 | 32.1 | 9.7 | 17.0 | 13.8 | 7.0 | 52/16 | Sub-Adult | |
| | ♀ | 129 | 208 | 29 | 25 | 35.5 | 30.2 | 9.3 | 16.1 | 12.9 | 6.9 | 53/16 | Adult | |
| | ♀ | 147 | 213 | 30.5 | 25 | 38.0 | 32.2 | 10.1 | 16.7 | 13.1 | 7.0 | 54/16 | " | |
| | ♀ | 130 | 220 | 31 | 25.5 | 36.2 | 31.0 | 9.4 | 16.5 | 12.9 | 7.0 | 55/16 | " | |
| | ♂ | 133 | 211 | 31.5 | 25 | 36.0 | 30.2 | 9.2 | 16.4 | 12.8 | 6.9 | 58/16 | " | |
| | ♂ | 156 | 214 | 30 | 25 | 37.1 | 32.3 | 9.4 | 16.7 | 14.0 | 7.1 | 59/16 | " | |
| | ♂ | | | | | | | | | | | 60/16 | " | |

MEASUREMENTS OF Rats from Western Java in mm.—Continued.

| BODY | | | | | | | | | | SKULL | | | | | REMARKS |
|-------------------------------|------|-----------|------|-----------------|-------------------------|-----------|--------------------|------------------|--------------|--------------------|-----------|-----------------|------|--------|------------|
| Head and Bodv. | Tail | Hind-foot | Ear. | Greatest length | Condylar basilar length | Dia-stema | Zygo-matic breadth | Length of nasals | Upper molars | Condition of teeth | F M S No. | | | | |
| <i>Rattus lepturus</i> (Jent) | Sex | | | | | | | | | | | | | | |
| Tjibodas, Gedeh, W Java | ♀ | 128 | 197 | 30 | 25 | 36.3 | 30.2 | 9.1 | 16.8 | 13.0 | 7.0 | SI | worn | 61/16 | Adult |
| " | ♀ | 130 | 221 | 30 | 24.5 | 36.2 | 30.9 | 9.1 | 16.8 | 13.1 | 7.0 | MI | " | 62/16 | " |
| " | ♂ | 144 | 229 | 31 | 24 | 36.3 | 31.8 | 9.3 | 16.5 | 12.6 | 7.1 | MI | " | 63/16 | " |
| " | ♂ | 148 | 216 | 32 | 25 | 37.0 | 31.0 | 9.1 | 17.0 | 13.0 | 7.1 | Un | " | 64/16 | " |
| " | ♀ | 146 | 223 | 31 | 25 | 37.0 | 31.3 | 9.2 | 16.9 | 12.9 | 7.1 | SI | " | 65/16 | " |
| " | ♀ | 138 | 210 | 31 | 26 | 36.2 | 30.3 | 9.0 | 16.8 | 12.9 | 7.1 | SI | " | 66/16 | " |
| " | ♂ | 150 | 231 | 32 | 24.5 | 39.1 | 33.7 | 9.3 | 17.2 | 14.0 | 7.2 | SI | " | 67/16 | " |
| " Badak, W Java, 7,900' | ♂ | 136 | 210 | 30 | 25 | 34.8 | 30.2 | 8.9 | 17.1 | 12.8 | 7.1 | SI | " | 81/16 | " |
| " | ♂ | 148 | 216 | 29 | 25 | 38.8 | 31.9 | 9.2 | 17.8 | 14.1 | 7.1 | MI | " | 89/16 | " |
| " | ♂ | 144 | 209 | 30 | 25 | 37.2 | 31.4 | 9.6 | 17.5 | 13.1 | 7.2 | MI | " | 85/16 | " |
| " | ♂ | 141 | 208 | 30.5 | 25.5 | 36.3 | 30.9 | 8.9 | 16.9 | 12.5 | 6.9 | Un | " | 90/16 | Sub-Adult. |
| " | ♀ | 137 | 198 | 30 | 25 | 36.7 | 31.2 | 9.2 | 16.5 | 13.1 | 7.2 | V ^{sl} | " | 86/16 | Adult |
| " | ♂ | 147 | 220 | 30.5 | 25.5 | 38.0 | 32.0 | 9.2 | 17.0 | 13.9 | 7.2 | MI | " | 84/16 | " |
| " | ♂ | 154 | 218 | 31 | 25 | 38.2 | 32.1 | 9.3 | 17.0 | 13.5 | 7.0 | MI | " | 87/16 | " |
| Tjibodas, Gedeh, W Java | ♂ | 139 | 196 | 32 | 24 | 36.3 | 30.4 | 9.2 | 16.9 | 13.1 | 7.2 | SI | " | 101/16 | " |
| " | ♀ | 147 | 219 | 31.5 | 24 | 37.3 | 31.7 | 9.8 | 17.6 | 13.3 | 7.0 | SI | " | 193/16 | " |
| " | ♀ | 129 | 218 | 29 | 24 | 37.1 | 30.1 | 9.2 | 16.6 | 12.9 | 7.1 | SI | " | 194/16 | " |
| " | ♂ | 150 | 244 | 33.5 | 27 | 39.8 | 33.0 | 10.0 | 17.4 | 14.3 | 7.2 | MI | " | 195/16 | " |
| " | ♀ | 139 | 217 | 29 | 24 | 37.7 | 32.0 | 9.8 | 17.1 | 13.6 | 7.0 | MI | " | 199/16 | " |
| Kandang Badak, W Java, 7,900' | ♂ | 155 | 222 | 30.5 | 25 | 39.0 | 33.0 | 9.8 | 17.9 | 14.0 | 7.1 | MI | " | 200/16 | " |
| " | ♂ | 160 | 222 | 30 | 25 | 39.0 | 32.2 | 10.0 | 17.8 | 14.0 | 7.1 | MI | " | 203/16 | " |
| " | ♂ | 139 | 221 | 31 | 25 | 38.0 | 32.9 | 9.6 | 17.3 | 14.2 | 7.1 | MI | " | 203/16 | " |
| " | ♂ | 141 | 221 | 31 | 25.5 | 38.0 | 32.9 | 9.9 | 16.9 | 13.6 | 7.0 | MI | " | 203/16 | " |
| " | ♂ | 156 | 225 | 30 | 25 | 38.2 | 33.0 | 9.9 | 17.6 | 14.0 | 7.0 | MI | " | 207/16 | " |
| " | ♂ | 148 | 215 | 30 | 25 | 38.4 | 32.2 | 10.0 | 17.9 | 14.2 | 7.1 | MI | " | 209/16 | " |
| " | ♂ | 148 | 226 | 31.5 | 25 | 38.0 | 32.8 | 10.0 | 17.2 | 13.2 | 6.9 | MI | " | 210/16 | " |
| " | ♂ | 145 | 211 | 30 | 24 | 38.1 | 32.0 | 9.9 | 17.1 | 14.1 | 7.0 | SI | " | 214/16 | " |
| " | ♂ | 152 | 232 | 31 | 24 | 37.3 | 32.6 | 9.8 | 17.7 | 13.9 | 7.1 | MI | " | 216/16 | " |

MEASUREMENTS OF Rats from Western Java in mm.—Continued.

| Body | | | | | | Skull | | | | | | | REMARKS | |
|-----------------------------------|-----|---------------|------|-----------|------|-----------------|-----------------|-----------|-------------------|------------------|--------------|--------------------|---------|----------|
| Rattus bartelsi (Jent) | Sex | Head and Body | Tail | Hind foot | Ear | Greatest length | Condylar length | Dia-stema | Zygomatic breadth | Length of nasals | Upper molars | Condition of teeth | | F M S No |
| Kandang Badak, Gedeh W Java 7900' | ♂ | 137 | 157 | 35 | 26 | 35.0 | 30.0 | 9.1 | 15.7 | 12.8 | 5.5 | Sl worn | 68/16 | Adult |
| " " | ♀ | 130 | 155 | 33 | 26 | 36.0 | 30.4 | 9.3 | 15.1 | 12.5 | 5.4 | Sl | 69/16 | " |
| Tjibodas, Gedeh, W Java 5000' | ♂ | 140 | 161 | 34 | 26 | 38.6 | 32.5 | 10.4 | 15.9 | 14.0 | 5.7 | MI | 70/16 | " |
| " " | ♀ | 153 | 166 | 33 | 25.5 | 37.1 | 32.6 | 9.9 | 16.1 | 13.8 | 5.5 | | 99/16 | " |
| " " | ♂ | 153 | 162 | 34 | 24.5 | 37.2 | 31.5 | 9.9 | 15.7 | 13.4 | 5.4 | MI | 100/16 | " |
| " " | ♂ | 148 | 153 | 33.5 | 24 | 35.5 | 30.3 | 9.2 | 15.4 | 13.8 | 5.3 | MI | 104/16 | " |
| " " | ♂ | 155 | 159 | 33.5 | 25 | 38.9 | 33.0 | 10.4 | 16.1 | 14.0 | 5.2 | | 106/16 | " |
| " " | ♂ | 160 | 179 | 30 | 26 | 38.4 | 33.2 | 10.6 | 16.0 | 15.2 | 5.2 | | 107/16 | " |
| " " | ♂ | 155 | 165 | 35 | 25 | 37.0 | 32.2 | 10.2 | | 14.1 | 5.4 | Sl | 08/16 | " |
| " " | ♂ | 153 | 163 | 34 | 26 | 36.1 | 31.0 | 9.9 | 15.2 | 14.1 | 5.2 | Sl | 109/16 | " |
| " " | ♀ | 154 | 153 | 34 | 24 | 36.4 | 31.1 | 9.9 | 15.8 | 14.8 | 5.6 | Sl | 110/16 | " |
| " " | ♀ | 151 | 164 | 33.5 | 25 | 37.3 | 31.7 | 9.7 | 16.1 | 15.1 | 5.2 | MI | 113/16 | " |
| " " | ♀ | 137 | 143 | 33.5 | 23 | 35.4 | 29.3 | 9.2 | 15.3 | 13.2 | 5.3 | Sl | 115/16 | " |
| " " | ♂ | 144 | 150 | 33 | 26 | 35.7 | 30.0 | 9.3 | 16.0 | 13.3 | 5.3 | Sl | 116/16 | " |
| " " | ♀ | 145 | 150 | 33 | 25 | 36.9 | 31.4 | 9.6 | 16.5 | 14.0 | 5.2 | MI | 117/16 | " |
| " " | ♀ | 141 | 162 | 34 | 25 | 36.3 | 30.8 | 9.5 | 16.0 | 13.9 | 5.4 | Sl | 118/16 | " |
| " " | ♀ | 137 | 153 | 33 | 26 | 36.1 | 30.6 | 9.9 | 16.0 | 13.8 | 5.3 | MI | 119/16 | " |
| " " | ♀ | 147 | 146 | 33 | 25 | 35.0 | 29.4 | 9.2 | 15.3 | 13.1 | 5.0 | MI | 120/16 | " |
| " " | ♀ | 124 | 144 | 33 | 24 | 35.0 | 29.0 | 9.0 | 14.9 app | 13.1 | 5.1 | V sl | 121/16 | MI adult |
| " " | ♂ | 156 | 169 | 33 | 26 | 38.1 | 32.2 | 10.0 | 16.2 | 15.2 | 5.4 | Sl | 123/16 | Adult |
| " " | ♂ | 147 | 157 | 33.5 | 25 | 36.0 | 30.0 | 9.8 | 16.0 | 15.0 | 5.3 | Sl | 124/16 | " |
| " " | ♀ | 141 | 157 | 33 | 25.5 | 37.1 | 31.1 | 9.8 | 15.9 | 14.8 | 5.6 | MI | 125/16 | " |
| " " | ♂ | 149 | 164 | 33.5 | 25 | 37.0 | 31.1 | 10.0 | 16.2 | 14.0 | 5.6 | MI | 126/16 | " |
| " " | ♀ | 134 | 151 | 33 | 26 | 35.4 | 29.8 | 0.4 | 15.5 app | 14.7 | 5.4 | V sl | 128/16 | MI adult |

MEASUREMENTS OF *Rats from Western Java* in mm.—*Continued.*

| Rattus bartelsi. | Body. | | | SKULL. | | | | | | | REMARKS. | | |
|---------------------------|-------|----------------|-----------------------|------------------|--------------------------|------------|---------------------|-------------------|---------------|---------------------|----------|--------------|----------------|
| | Sex. | Head and Body. | Tail. Hind-foot. Ear. | Greatest length. | Condylor-basilar length. | Dia-stema. | Zygo-matic breadth. | Length of nasals. | Upper molars. | Condition of teeth. | | F. M. S. No. | |
| Tjibodas, W. Java, 5000'. | ♂ | 145 | 170 | 34 | 25 | 37.0 | 31.6 | 10.0 | 16.0 | 14.6 | worn | 129/16 | Adult |
| " | ♀ | 164 | 156 | 33 | 24 | 36.1 | 30.0 | 9.8 | 15.8 | 14.1 | " | 130/16 | " |
| " | ♂ | 156 | 156 | 34 | 25 | 39.0 | 32.4 | 10.1 | 16.1 | 14.8 | " | 179/16 | " |
| " | ♀ | 150 | 161 | 34 | 26 | 37.8 | 31.3 | 9.9 | 16.3 | 14.5 | " | 180/16 | " |
| " | ♀ | 151 | 149 | 34 | 23 | 37.4 | 31.5 | 10.0 | 16.4 | 14.3 | " | 181/16 | " |
| " | ♂ | 151 | 156 | 33.5 | 25 | 37.9 | 31.7 | 10.0 | 16.1 | 14.1 | " | 182/16 | " |
| " | ♂ | 143 | 146 | 33 | 25 | 36.8 | 31.8 | 9.9 | 16.0 | 13.9 | " | 183/16 | " |
| " | ♂ | 153 | 157 | 33 | 24 | 36.1 | 31.0 | 9.8 | 16.0 | 14.1 | " | 185/16 | " |
| " | ♂ | 138 | 167 | 35 | 26 | 37.9 | 32.1 | 10.1 | 16.3 | 14.0 | " | 187/16 | " |
| " | ♂ | 139 | 164 | 34.5 | 24.5 | 36.2 | 30.1 | 9.9 | 16.1 | 14.0 | " | 186/16 | " |
| " | ♂ | 150 | 154 | 34 | 24 | 36.8 | 31.0 | 10.1 | 15.9 | 14.0 | " | 220/16 | " |
| " | ♀ | 156 | 167 | 33.5 | 25 | 38.0 | 32.3 | 10.1 | 15.0 | 13.8 | " | 222/16 | " |
| " | ♂ | 136 | 163 | 33.5 | 26 | 36.9 | 31.8 | 10.0 | 15.7 | 14.7 | " | 226/16 | " |
| " | ♀ | 148 | 157 | 32.5 | 25 | .. | 32.0 | 10.0 | 16.7 | 14.0 | " | 228/16 | " |
| " | ♂ | 159 | 164 | 34 | 25 | 38.0 | 31.7 | 10.1 | 15.8 | 14.6 | " | 230/16 | " |
| " | ♂ | 145 | 160 | 34 | 25 | 37.0 | 32.8 | 10.4 | 16.1 | 15.0 | " | 233/16 | " |
| " | ♀ | 147 | 167 | 34 | 24.5 | 38.0 | 32.8 | 10.5 | 16.4 | 15.2 | " | 236/16 | " |
| " | ♂ | 147 | 171 | 36 | 27 | 37.8 | 32.0 | 10.2 | 16.0 | 13.9 | " | 241/16 | " |
| " | ♂ | 156 | 161 | 35 | 27.5 | 38.0 | 32.1 | 10.1 | 16.0 | 14.0 | " | 242/16 | " |
| " | ♂ | 149 | 158 | 33.5 | 26 | 37.2 | 31.8 | 10.2 | 16.1 | 14.1 | " | 243/16 | " |
| " | ♀ | 147 | 148 | 34 | 26 | 36.9 | 31.2 | 10.0 | 16.0 | 13.8 | " | 245/16 | " |
| " | ♀ | 147 | 155 | 34 | 23 | 36.2 | 31.1 | 9.6 | 16.0 | 13.9 | " | 282/16 | Adult. N.C.M.* |
| " | ♀ | 146 | 149 | 31 | 25 | 35.3 | 30.0 | 9.3 | 15.1 | 13.2 | " | 279/16 | Adult. N.C.M. |
| " | ♂ | 154 | 167 | 33 | 25 | 37.3 | 31.4 | 9.9 | 15.8 | 14.1 | " | 286/16 | Adult. N.C.M. |

* N.C.M. signifies Body measurements by Native Collector

XIII. ON THREE NEW RACES OF MALAYAN MAMMALS.

By H. C. ROBINSON, C.M.Z.S.

NYCTICEBUS COUCANG INSULARIS, *subsp. nov.*

Type:—Old male (skin and skull) No. 963/15, Federated Malay States Museums, collected at Sungei Nipa, south end of Pulau Tioman, Pahang, on July 19th, 1915, by H. C. Robinson.

Characters:—Allied to the mainland form, *N. c. buku* (Martin), but separated from that by the indistinctness of the facial markings, the absence of any vertebral streak and the general rufous colouring. Skull with the temporal ridges not meeting; two pairs of upper incisors.

Colour:—Above ochraceous tawny, considerably paler beneath; head and face silvery, the eyes surrounded by a broad ring of sienna brown, extended as a stripe from each eye meeting on the temple; hands and feet paler and more silvery. Bases of the fur above and below pale grey.

Skull:—Bullae and basal region of skull rather more flattened than in *N. c. buku*; temporal ridges separated by about 8 mm. Incisors two pairs in the upper jaw.

Measurements:—Head and body (measured in the flesh) 265; hindfoot 53; ear 14 mm.

Cranial measurements: total length, 60.0; basal length, 49.9; orbital breadth, 37.3; greatest width of skull, 40.1; cranial breadth, 29.2; mastoid breadth 37.1; front of canine to back of last upper molar, 21.5 mm.

Remarks:—The colour of this race sufficiently separates it from *N. c. buku* while the absence of the vertebral stripe differentiates it from *N. c. natunae*, which, however, is somewhat imperfectly known.

It appears doubtful if the characters of the temporal ridges relied on by Lyon to separate the various races of the Slow Lemur can really be trusted to do so. In the present specimen however it seems certain that they would never meet, which would ally the Tioman race to those from Borneo and Banka which have only a single pair of incisors in the upper jaw whereas this one has two pairs.

The Slow Lemur is apparently rare in Tioman and is unknown to the majority of the inhabitants. Our specimen was obtained in felling a patch of heavy jungle at the south end of the island.

Incidentally it may be noted that the proper name for the Malayan Slow Lemur now generally known as *N. c. malaianus*, (Anderson), is *Nycticebus c. buku* (Martin) founded

on *Semnopithecus buku*, Martin, Ann. and Mag. Nat. Hist. (4), ii p. 435 (1838) itself derived from Raffles' Kra Buku (Trans. Linn. Soc. xiii, p. 247 (1821) which is quite a passable description of the animal.

LARISCUS INSIGNIS FORNICATUS, *subsp. nov.*

Type:—Adult female (skin and skull) No. 876/15, Federated Malay States Museums, collected at Juara Bay, East Side of Pulau Tioman, Pahang, on July 1st, 1915, by H. C. Robinson. Original No. 6698.

Characters:—Differing from other forms of *Lariscus insignis* (Cuv.), in its somewhat slighter skull, the nasals broadening less anteriorly and by having the rostrum decidedly more arched laterally, i.e. the nasals meet at an angle instead of lying practically in the same plane.

Colour:—As in the more southern specimens of *Lariscus insignis jalorensis*, being exactly matched by individuals from the Triang District, Western Pahang and having the thighs richly washed with rufous buff more so than in northern specimens, but not approaching in richness of tint above, the Singapore and Johore form, *L. i. meridionalis*, Robinson & Kloss. Area between the black back stripes, somewhat colder in tint than the rest of the upper surface.

Skull:—That of a typical *Lariscus*, though with the regularly curved outline somewhat flattened in the region of the frontals. Nasals less splayed anteriorly and decidedly arched. Rostrum generally more slenderly built. Bullae rather less convergent than in the peninsular form so that the basioccipital is more regularly quadrate in shape. The teeth are rather small but call for no special comment.

Dimensions of the type (measured in the flesh). Head and body, 171 (180¹); tail, 112 (100); Hindfoot, 44 (43); ear, 18 (16) mm.

Cranial measurements. Total length, 48.8 (48.2); condylo-basilar length, 38.0 (36.9); zygomatic breadth 27.1 (26.8); cranial breadth, 20.0 (20.2); greatest length of nasals, 15.6 (15.8); diastema, 12.3 (12.1); upper molar row including pm³, 8.9 (8.9); least distance from tips of nasals to lachrymal notch, 21.0 (21.0) mm.

Specimens examined:—Four, the type, and an adult and two somewhat immature males all from the typical locality.

Remarks:—Though only slightly differentiated from the mainland race, this form appears sufficiently distinct to merit a name. In colour it is intermediate between *L. i. jalorensis*, from the mainland and *L. i. meridionalis* from Singapore and the southern part of Johore. The characters of the nasals however separate it from both these forms.

(1) Measurements in parentheses are those of an adult male from the same locality F M S. No 623/16

TOMEUTES TENUIS TIOMANICUS, *subsp. nov.*

Type:—Adult male (skin and skull) No. 728/15, Federated Malay States Museums collected at Juara Bay, East side of Pulau Tioman, Pahang, on June 23rd, 1915, by H. C. Robinson. Original No. 6580.

Characters:—A dull form of *T. tenuis*, more allied to the northern race *T. tenuis surdus* (Miller) than to the brighter typical form from the southern two thirds of the Peninsula and Singapore Id., (*T. tenuis tenuis* (Horsf.)). Differing from *T. tenuis sordidus* (Kloss) from Great Redang Island, in the greater amount of black on the tail and from *T. t. surdus* in the more olivaceous, less ochraceous ground colour of the upper surface and in the reduction of the white tips to the hairs of the tail.

Colour:—Above an uniform grizzle of black and dull olivaceous buff, shoulders, thighs, ears more ochraceous, feet and hinds grizzled blackish and ochreous buff not nearly so bright as in *T. tenuis tenuis* from Singapore. Tail above white, bases of the hairs ochraceous buff, less bright than in the mainland races but much brighter than in the form from Great Redang Id., median area clear black, with a narrow white tip. Pencil almost uniform black. Base of tail beneath and scrotal region buffy. Beneath whitish with a strong cream tint, the bases of the hairs except on the chin, throat and median line broadly grey. Orbital ring, sides of the face and muzzle buffy ochraceous, the two latter more or less grizzled with black. A clear buffy patch at the base of the vibrissae.

Skull and Teeth:—The skull and teeth show practically no differences from the two mainland representatives and are not reduced in size. The bullae are perhaps a little less globose and slightly smaller and the constrictions which are very noticeable in the mainland specimens are much less pronounced. The zygomatic arches are a little heavier.

From the Great Redang, *T. t. sordidus*, the Tioman animal differs in larger size and heavier and deeper rostrum. The regularity of the maxillary nasal suture which is given by Kloss as the only distinguishing cranial feature of his form does not appear to be reliable as it is not constantly present in all the Redang specimens while it occurs in at least 15 per cent. of specimens from other sources.

Measurements:—Collector's external measurements of type: head and body, 125 (136);* tail, 107 (109); hindfoot, 31 (30.5); ear, 13 (13) mm.

Cranial measurements: greatest length, 37.1 (35.2); condylobasilar length, 30.8 (—) interorbital breadth, 12.2 (12.9); palatilar length, 15.9; diastema, 8.2; cranial breadth, 18.1; zygomatic breadth, 22.1 (21.7) maxillary tooth row, 6.9; median length of nasals, 11.1 mm.

Measurements in parentheses are those of a *T. tenuis surdus*, F. M. S. Mus. No. 123/13 collected on Kao Nawng, Bandon, Siamese Malay States on June 14th 1913.

(For detailed measurements see p. 105.

Specimens examined:—Twenty-six, all from the type locality.

KEY TO THE LOCAL MALAYAN RACES OF

Tomentes tenuis (HORSF.).

- A. Larger forms; total length of skulls never less than 39 mm.
 - a. Larger, much more greyish beneath, ochraceous yellow patch on outer aspect of thighs, strongly marked *T. tenuis tahan.*
 - a¹. Smaller, more yellowish buff beneath, ochraceous yellow patch on outer aspect of thighs only slightly marked *T. tenuis gunong.*
- B. Smaller forms; total length of skull never more than 37.5 mm.
 - b. Richly coloured forms; shoulder and thigh patches, strongly marked; hands and feet bright ochraceous buff *T. tenuis tenuis.*
 - b¹. Dull coloured forms; shoulders and thigh patches not strongly marked; hands and feet dull olivaceous buff.
 - c. Black element in pelage of tail much reduced *T. tenuis sordidus.*
 - c¹. Black element in pelage of tail normal.
 - d. More ochraceous above, terminal whitish tips to tail hairs well marked *T. tenuis surdus.*
 - d¹. More olivaceous above, terminal whitish tips of tail hairs reduced *T. tenuis tiomanicus.*

MEASUREMENTS OF *Tomentes tenuis tiomanicus* in mm.

| Body | | | | | | Skull | | | | | | | | Remarks |
|----------------------|---------------|-------|-----------|------|----------------|-------------------------|------------|--------------------|--------|--------------|--------------------|---------|--------|-------------|
| Sex | Head and Body | Tail. | Hind-foot | Ear | Greater length | Cond ylo basilar length | Dia sterna | Zygo-matic breadth | Nasals | Upper molars | Condition of teeth | No | | |
| Juara Bay, P. Pahang | ♂ | 133 | 105 | 29 | 14 | 36.9 | 30.5 | 8.1 | 22.3 | 11.1 | 7.0 | SI worn | 750/15 | Adult |
| " | ♀ | 127 | 99 | 30 | 13 | 37.0 | 30.1 | 8.0 | 22.2 | 11.2 | 7.2 | " | 725/15 | Yg Adult |
| " | ♀ | 135 | 105 | 29 | 13 | 37.4 | 30.8 | 8.2 | 22.3 | 11.7 | 7.1 | MI | 755/15 | Adult |
| " | ♂ | 138 | 94 | 26 | 15 | 36.5 | 30.2 | 8.1 | 21.4 | 11.7 | 7.0 | " | 753/15 | " N. C. M * |
| " | ♀ | 138 | 105 | 27 | 15 | 37.2 | 30.9 | 8.2 | 22.2 | 11.8 | 7.0 | SI | 752/15 | " |
| " | ♀ | 135 | imp | 25 | 15 | 36.2 | 30.0 | 8.0 | 22.4 | 10.9 | 6.5 | " | 754/15 | " |
| " | ♂ | 125 | 107 | 31 | 13 | 37.1 | 30.8 | 8.2 | 22.1 | 11.1 | 6.9 | " | 728/15 | Type |
| " | ♀ | 137 | 116 | 32.5 | 13 | 37.2 | 31.0 | 8.1 | 22.2 | 11.3 | 7.0 | Not | 33/15 | Yg. Adult |
| " | ♀ | 130 | 102 | 30.5 | 13 | 35.9 | 29.2 | 7.8 | 22.3 | 11.0 | 6.9 | " | 722/15 | " |
| " | ♀ | 131 | 104 | 29 | 13 | 36.1 | 29.3 | 7.8 | 22.1 | 11.7 | 6.8 | " | 730/15 | Adult |

*N C M signifies Body Measurements by Native Collector

XIV. REPORT ON A COLLECTION OF REPTILES AND BATRACHIANS FROM JAVA.

By N. ANNANDALE, D.Sc., F.A.S.B., (*Zoological
Survey of India*).

Mr. H. C. Robinson has kindly given me the opportunity of examining a collection of reptiles and Batrachia made by him in February, 1916, at Tjibodas, in the mountains of Western Java, at altitudes between 4,700 and 6,500 feet. He has further permitted me to retain in the Indian Museum a first set of all the specimens, including the type of the only new species, a frog of the interesting genus *Nyctixalus*, Boulenger.

There is no recent monograph on the herpetology of Java, but both the reptiles and the Batrachia are well known and Tjibodas has been a favourite collecting station. In his memoir entitled "A Contribution to the Zoögeography of the East Indian Islands" Barbour¹ has discussed the distribution of both groups in reference to the island as a whole, but, as in most eastern countries, there is still much to be done in the study of local faunas.

Mr. Robinson's collection is evidently representative of the local fauna of the district in which it was made. It includes specimens of 13 species of reptiles and of 13 of batrachians, as follows:—

REPTILIA.

Lizards—

| | |
|--|---------------|
| <i>Gonyocephalus chamueleontinus</i> (Laur.) | 10 specimens. |
| <i>Calotes tympanistriga</i> (Gray) | ... 10 .. |
| <i>Lygosoma temminckii</i> , D. & R. | ... 28 .. |
| <i>Mabuia multifasciata</i> (Kuhl.) | ... 7 .. |

Snakes—

| | |
|--|------------------|
| <i>Tropidonotus chrysargus</i> , Schleg. | ... 2 specimens. |
| <i>Zamenis korros</i> (Schleg.) | ... 1 juv. |
| <i>Oligodon bitorquatus</i> , Boie | .. 1 specimen. |
| <i>Calamaria leucocephala</i> , D. & B. ² | ... 1 .. |
| <i>Calamaria linnaei</i> , Boie | ... 3 specimens. |
| <i>Psammodynastes pulverulentus</i> , Boie | ... 3 .. |
| <i>Bungarus candidus</i> , Linn. | ... 1 specimen. |
| <i>Doliophis intestinalis</i> (Laur.) | ... 1 .. |
| <i>Ancistrodon rhodostoma</i> (Boie) | ... 2 specimens. |

(1) *Mém. Mus. Zool. Harvard*, XLIV, No. 1 (1912)

(2) A melanic specimen in which the greater part of the ventral surface as well as the whole of the dorsal and lateral surfaces, is darkened.

BATRACHIA.

| | | |
|--|-----|---------------|
| <i>Rana grunniens</i> , Daudin | ... | 2 specimens. |
| <i>Rana kuhlii</i> , D. & B. | ... | 2 „ (juv.). |
| <i>Rana limnocharis</i> , Wiegmann | ... | 7 „ |
| <i>Rana javanica</i> , Horst. | ... | 1 specimen. |
| <i>Rana chalconota</i> (Schleg.) | .. | 23 specimens. |
| <i>Rana jerboa</i> (Günther) | .. | 6 „ |
| <i>Ixalus aurifasciatus</i> (Schleg.) | ... | 21 „ |
| <i>Nyctixalus robinsoni</i> , sp. nov. | ... | 3 „ |
| <i>Microhyla annectens</i> , Boulenger | ... | 17 „ |
| <i>Bufo asper</i> , Gravenh. | ... | 1 specimen. |
| <i>Bufo cruentatus</i> , Tschudi | ... | 20 specimens. |
| <i>Megalophrys husseltii</i> (Tschudi) | | 3 „ |
| <i>Megalophrys montana</i> , Kuhl | ... | 14 „ |

I have nothing further to say about the reptiles, all of which are well-known species. Descriptions of the lizards will be found in de Rooij's volume¹ on the Indo-Australian lizards and Chelonia, and of the snakes in the British Museum Catalogue.

The frogs and toads call for comment or description in several instances, the excellent state of preservation of most of Mr. Robinson's specimens permitting points hitherto obscure to be elucidated.

FAMILY RANIDAE.

Genus RANA, Linné.

RANA JAVANICA, Horst.

1883. *Rana macularia*, var. *javanica*, Horst, *Notes Leyden Mus.* V. p. 243.

1891. *Rana nicobariensis*, Boulenger, *Ann. Mag. Nat. Hist.* (6) VIII, p. 291.

1906. *Rana javanica*, van Kampen, Weber's *Zool. Ergebn. Nied. Ost.-Ind.* IV. p. 392.

1912. *Rana nicobariensis*, Boulenger (in part), *Faun. Malay Pen., Rept.*, p. 240.

1912. *Rana javanica*, Barbour, *Mem. Mus. Zool. Harvard* XLIV, p. 169.

There is a single specimen in the collection; it is 32 mm. long from the tip of the snout to the vent. I have compared it with the types of Stoliczka's *R. nicobariensis*, which are faded but otherwise in good condition. It differs from them in most of the points noted by van Kampen as specific, notably

(1) *The Reptiles of the Indo-Australian Archipelago I.* (Leiden: 1915).

in the broader interorbital space and narrower web to the toes. The colouration is also strikingly different. The back is pinkish buff with sparsely scattered small round black spots and with a faint pale middorsal line extending forwards from the vent about half way to the shoulders. The sides of the head and the anterior half of the body are black, but both lips are white, the white area on the upper lip extends backwards as a broad line as far as the axilla and there is a narrow white line running forwards from the upper eyelid to the tip of the snout. The sides of the posterior half of the body are a little darker than the back and bear numerous black spots; the area thus coloured is separated from the dorsal surface by a thin black line. The fore limbs are pale with indistinct dark spots of small size, but the hind limbs are darker than the back and are marked with incomplete dark cross-bars. A thin black line extends along the middle of the upper surface of the thigh and behind it the skin is spotted. The whole of the ventral surface is unpigmented.

A specimen of *R. nicobariensis* from the Jalor Caves, near Biserat in Peninsular Siam on the other hand, agrees fairly well with the types of the species.

Genus IXALUS, D. & B.

Stejneger[†] has shown that in the strict letter of the law the name of this genus should be *Philautus*, Gistel. Four species have been recorded from Java, namely *flavosignatus* (Boettger), *aurifasciatus* (Schlegel), *vittigera* (Boulenger) and *pallidipes* (Barbour). After some doubt I have decided that the large series of specimens in Mr. Robinson's collection all represent the second of these.

IXALUS AURIFASCIATUS (Schlegel).

1844. *Hyla aurifasciata*, Schlegel, *Abbild.*, p. 27, pl. ix., fig. 4.

1882. *Ixalus aurifasciatus*, Boulenger, *Cat. Batr. Sal. B. M.*, p. 100.

Schlegel's figure gives a very good idea of the facies and proportions, but it is evident from the specimens before me that the colouration is almost as variable as in *I. variabilis* from Ceylon and South India. None of these specimens happen to bear the golden band across the forehead from which the specific name is derived. There are two large specimens (snout to vent 27 mm.) of very remarkable colouration. In one the whole of the dorsal surface is black, with irregular yellow streaks which converge inwards from the sides. In the other the colours are the same but the yellow predominates over the black. There seems to be no vocal sac in the adult male.

[†] *Proc U. S. Nat. Mus* XXVIII, p. 346 (1905)

Genus NYCTIXALUS, Boulenger.

1882. *Nyctixalus*, Boulenger, *Ann. Mag. Nat. Hist.* (5) X, p. 35.

1912. *Nyctixalus*, Barbour, *Mem. Mus. Zool. Harvard* XLIV (1), p. 70.

The only form hitherto assigned to the genus is the type-species *N. margaritifer*, Boulenger. It is recorded as being from "the East Indies." Barbour examined a specimen from Tjibodas and published a figure, which is certainly incorrect. (*op. cit.*, pl. viii, fig. 32). He noted certain peculiarities, however, that also occur in Mr. Robinson's specimens. The differences must, therefore, be specific and I describe the Javanese form as a new species, under the name

NYCTIXALUS ROBINSONI, *sp. nov.*

Head large, triangular; snout pointed, a little longer than the orbit; nostril about half way between the eye and the tip of the snout, rather prominent. Tongue deeply notched, without free papilla. No vocal sacs. Interorbital space flat, broader than upper eyelid. Tympanum hidden, very small. A strong fold from the upper eyelid to the shoulder. Dorsal surface of head and body with scattered rounded tubercles; eyelid tubercular; ventral surface of head and body coarsely tubercular. Hind limbs long; tibiotarsal articulation reaching the anterior margin of the eye or the tip of the snout. Subarticular tubercles poorly developed; an obscure inner metatarsal tubercle. Discs on fingers and toes at least as large as the tympanum. Digits short; first finger not extending as far as second; toes about $\frac{1}{3}$ webbed; no web on the fore feet.

Length of head and body in type-specimen 20 mm.

Dorsal surface dark grey or brown, obscurely mottled; a silvery cross-bar sometimes present between the eyes. Flanks mottled with black and white. Hind limbs with irregular brown cross-bars. Ventral surface speckled with grey or entirely infuscated.

The species differs from *N. margaritifer* in its small hidden tympanum, in the position of the nostril and probably in other points. The iris can apparently be closed completely over the pupil, but Barbour's figure represents the opening as very large and transversely oval, thus completely ignoring the essential generic character, which is the vertical form of the slit. Apart from this character and from its darker colouration the species closely resembles *Ixalus aurifasciatus*.

Locality. Tjibodas, Java: alt. 4,700-6,500 feet (February, 1916).

Type-specimen. No. 18,337 Rept., Zool. Survey India. Cotypes in the Selangor Museum.

FAMILY PELOBATIDAE.

Genus MEGALOPHRYS, Kuhl.

MEGALOPHRYS MONTANA, Kuhl.

1912. *Megalophrys montana*, Boulenger, *Faun Malay Pen., Rept.*, p. 277.

1912. *Megalophrys montana*, Barbour, *Mem. Mus. Zool, Harvard XLIV* (1) p. 77, pl. vii, fig. 30 (coloured figure).

In Mr. Robinson's series there are several specimens with minute appendages on the eyelids and snout and two young individuals with these appendages so well-developed that they appear to represent a form intermediate between *M. montana* and *M. nasuta*. I doubt, therefore, whether *M. nasuta* (Schleg.) is more than a variety of *M. montana*. Kuhl.

XV. FURTHER NOTES ON AN ABORIGINAL TRIBE OF PAHANG.

By IVOR H. N. EVANS, B.A.

The following notes on customs, religious beliefs, etc. were omitted from a former paper of mine in this Journal,* which dealt with several of the aboriginal tribes of Pahang. They refer to a tribe, or section of a tribe, of Jakun whose place of origin is said to be Salang on the Tekam River, Pulau Tawar, but who, when I met them, were settled on the Tekai River.

BELIEFS WITH REGARD TO NATURAL PHENOMENA.

(1.) According to the Jakun the sun is held by an ant eater. When he rolls his body round it the light is no longer seen and it is night; but, when he unrolls himself, the sun shines clearly and it is day.

(2.) The rainbow is a dragon in the sky.

(3.) An eclipse of the moon portends sickness.

(4.) Thunder is made by a spirit called *Ninek*,† who makes a noise in his armpits by banging his arms against his body.

(5.) *Ninek* makes the lightning by flashing a thin board about which is attached to a string (i.e. a bull-roarer).

THE UNDER-WORLD.

The Jakun gave me some details with regard to their belief in an under-world. I recount them below, just as they were told to me.—

There are dragons in the under-world and a single old woman. She makes her house and her belongings from the bones of people who have died upon the earth. Their ribs become the floor of her house, their leg-bones the posts, and their skulls water-vessels. This woman, when she has reached the limits of old age, becomes young again. Her name is Arud. The dragons, who have horns, are her playthings. One of them is her special pet and sits close to her.

CUSTOMS AND BELIEFS CONNECTED WITH DEATH AND BURIAL.

The following details with regard to customs and beliefs connected with death and burial were given me by one of the men of the settlement.

* Vol. V, pp. 209-211 (1915)

† *Nyani* as an equivalent for the Malay *hantu* is a common word in many Sakai dialects. *Ed.*

On a death occurring, the village is deserted. A corpse is not buried, but is left in the house where death took place; food, tobacco and personal belongings being placed near to it. The hut in which a body is left is often fenced round. Corpses are not buried because it is thought that the spirits of the dead would find difficulty in making their way upwards if this were done.

A CUSTOM WITH REGARD TO PERSONAL NAMES.

I was informed that names given in childhood are often changed at about the age of puberty. For instance, the Jakun told me that one man named Itam had formerly been called Ketiel.

XVI. MALAY BACK-SLANG.

By IVOR H. N. EVANS, B.A.

The following are some examples of one kind of Malay back-slang *chukap balik* (obtained from a Linggi, Negri Sembilan, Malay), which is used by bad mannered Malay children when they wish to talk secrets before their elders and betters or before uninitiated companions. The first stanza is a *pantun* in ordinary Malay, the second the same converted into back-slang. A beginner is supposed to learn both of these by heart in order to acquire a facility in this secret means of communication. There do not seem to be any very well defined rules for converting ordinary words into back-slang by this method, except that in those of two syllables, the syllables are generally transposed. In three-syllable words, letters or syllables may be inserted and the original letters or syllables transposed, but the last syllable in many cases remains unchanged.

Rioh rendah bunyi-nya burong.

Burong terbang deri sa'brang.

Hinggap sa'ekor atas bumbongan (tulang bumbong).

Menegoh bumbongan hanyut deri ulu.

Perisek pekasam udang.

Anak rimau jantan mati jerongkong.

Yori yarah nubi nerubong.

Nerubong terbarung rida serabung.

Ngahip jikou latung u-ung.

Megonoh latung u-ung nyor-at rida luhu.

Pesingik pesangam dahung.

Nahak mori tajan tima jikorong.

Further examples of ordinary Malay with back-slang equivalents.

(1) Angkou hendak ka'mana ?

(1a) Angkangou nahak kenema ?

(2) Aku hendak pergi Taiping.

(2a) Kua nahak giper Payteng.

The next example was given to me by a Province Wellesley man. In it the insertion or addition of the letter *s* either with, or without, a vowel before or following it seems to be the chief feature. There appear to be many different methods of talking back-slang.

(1) Hang nak pergi kemana ?

(1a) Has nasak perasgisi kas-mas-nasa ?

The following are instances from Kuala Langat (fide Raja Mutlak).

- (1) Mari kita makan nasik ;
(1a) " Rima taki kaman senak."
- (2) Terima kaseh ; Sahaya baru sudah.
(2a) " Matri sekah ; yahsa ruba dasu."
- (3) Orang itu banyak tinggi.
(3a) " Raong too-i nyabak giting."
- (4) Lebih daripada anam kaki.
(4a) " Beleh daparida mama kika."
- (5) Besok kita pergi ka-singapura.
(5a) " Sebok taki giper ka-Ngasingrupa.'
- (6) Berapa hari baru kita balek ?
(6a) Pabera hira ruba taki lebak ?
- (7) Barang satu minggu !
(7a) " Rabang tusa guming."

XVII. MALAY NOTES.

By IVOR H. N. EVANS, B.A.

The following disconnected notes on some Malay beliefs and customs, collected in the Malay Peninsula at various times during the last four years, may possibly be of interest, since I do not remember having seen many of them recorded before. In each case I append the name of the district from which my informant came.

- (i) Houses should not be built on promontories, either those which jut out into the rivers or into padi fields, as such places are frequented by spirits. (From a man of Kampong Linggi, Negri Sembilan).
- (ii) If you hear a noise at night in the jungle, it is forbidden to call out and ask your companions what is making it. (From a man of Kampong Linggi, Negri Sembilan).
- (iii) A small species of house-cricket, which is known to the Malays as *Semangat rumah*, is said to indicate the good or evil fortune of the owner of a house. If the cricket is first heard low down in the wall but gradually makes its way up higher, it is considered to imply that the house-holder will become rich. If, however, the sound of the cricket is first heard high up, and then lower down, monetary losses will be incurred. (From a man of Kampong Linggi, Negri Sembilan).
- (iv) Nests, either of the black ant or of the termite, are sometimes thought to be the dwelling places of spirits. (Awang, a Malay smith of Lenggong in Upper Perak asked me one day to desist from poking an ant-hill, which stood close to his forge, with my walking stick. On my asking the reason he replied that there was a spirit in it. Questioned as to his grounds for thinking so, he said that, if there were not, he did not see how such a tall mound could have arisen).
- (v) It is unlucky to step over a fishing-rod which has been left lying on the bank of a river with the line in the water. Mothers scold their children if they do this when a family party is out fishing, as they think that no fish will be caught. (From a native of Ijok, Selama District of Perak).

- (vi) Women, while making the yeast (*ragi*) for *tapai* cakes, must not see a corpse, or, when they are made, fermentation of the flour will not ensue. (From a Malay of Kampong Linggi, Negri Sembilan).
- (vii) According to Province Wellesley Malays fire-flies are the clippings from peoples' finger nails.
- (viii) If you think that you have seen a ghost, you must spit three times, in order that no evil results may follow. (From a Province Wellesley Malay).
- (ix) A couple of nights after the death of the late Sultan Ahmad of Pahang (May, 1914) there was a bad storm of wind in Taiping. This was considered by all the Malays living in the town as a sign of the Sultan's passing.
- (x) If a cock and a hen copulate on the roof of a Malay house, they are caught and killed. Both are then skinned and the skins placed on slender poles planted in the ground, one on each side of a path. A cross piece is often tied to the upright, a little way from the top, in order that the skin of the body may be spread over it, while the head and neck of each bird rest on the end of the upright. The flesh of the birds is eaten by the people of the house. The action is said to be *chelaka*, i.e. unchancy. (I saw two or three instances of crucifixion of this kind when in Upper Perak in 1913.
- (xi) If a man washes his hands and in shaking the drops from them (to dry them) splashes a companion, the latter says, "*Lepas kah?*" (i.e. "Do you release me?"). To this the man who has been washing must reply "*Lepas*" (i.e. I release you). If this were not done the sins (*dosa*) of the man who washed his hands would cling to the man who was splashed. (I saw a man so splashed, and heard the above question and answer in 1916. The explanation was given to me by a Province Wellesley Malay, one of the men concerned).
- (xii) After the *boria* performances (connected originally with the deaths of Hasan and Husain, but now more or less comic entertainments given by bands of Penang or Province Wellesley Malay youths, who visit the houses of the wealthy in the month Muharram) all those who have taken part in a *boria* go after the last performance to bathe ceremonially in order to rid themselves of the bad luck (*buang-kan sial*), which attaches to them as having part in a dramatic performance. At Taiping in Perak the *boria* performers bathe at the

Waterfall, and, after this, partake of a curry feast. The washing of the body should be done with seven dippers of water in which limes and soap-root* (*sintok limau*) have been mixed till the water is full of suds. When the bathing is over the remains of the *sintok* and the limes are thrown away, each thrower saying, "*Satu, dua, tiga buang!*" (i.e. "one, two, three, throw them away!"). The "soap" is, of course, washed off afterwards in the ordinary way. Before the feast commences a handful of food—all the kinds to be eaten being included—is taken and placed below a tree in the jungle. The *boriu* is performed only by Penang and Province Wellesley Malays, and is said to have originally been adopted from Indian Troops stationed in Penang. (Information obtained from Awang, a Province Wellesley Malay).

* The root or fibre of *Cinnamomum sentu*.

XVIII. THE NATURAL HISTORY OF KEDAH PEAK.

VI. BOTANY.

By H. N. RIDLEY, M.A., C.M.G., F.R.S., F.L.S.

LATE DIRECTOR OF GARDENS, STRAITS SETTLEMENTS.

[The following order belonging to the Monocotyledons was omitted in Mr. Ridley's account of the Botany of Kedah Peak. Antea pp. 37—88.]

XYRIDEÆ.

Xyris Ridleyi Rendle.

Mixed with the next species. This was the original locality of this plant.

XYRIS OREOPHILA, *sp. nov.*

A tufted plant about 12–18 in. tall. Stems swollen at base. Leaves linear flaccid acuminate 8 in. long .1 in. wide, (No. 6138) or rigid and narrower (5962). Culms slender, terete 8 to 18 in. long. Capitulum obovoid .2 in. long. Glumes brown, oblong, the lower ones truncate, emarginate, uppermost blunt, entire, a paler thickened ridge in the centre, the margin thinner but not scarious. Flowers bright yellow .3 in. long, the tube slender, exsert. Petals broadly oblong, obovate, minutely toothed at the rounded top, .15 in. wide. Stamens about half as long, staminodes short, plumed, style and stigmas shorter than anthers. Fruit fusiform, dehiscent down one side, seeds numerous, linear cylindric, narrowed at both ends 1 mm. long.

Kedah Peak 3000 feet alt. Nos. 5962, 6138, 6139. The specimens of the latter number are evidently from a wetter spot and are shorter and more flaccid. It is a much bigger plant than *X. Ridleyi*. The petals are described as butter cup yellow.

XIX. ON THE MONGOOSES OF THE MALAY PENINSULA.

By C. BODEN KLOSS, F.Z.S.

Six species of mongooses are now known to occur in the Malay Peninsula, two of which are described below. One of the six is apparently not indigenous; it is:—

MUNGOS MUNGOS (Gmel.).

Mangusta malaccensis, F. Cuv., Mamm. pl. 189 (1819).

Herpestes griseus, Cantor, Journ. Asiat. Soc. Bengal, XV, p. 242 (1846).

Herpestes pallidus, Anderson, Zool. Researches, p. 181 (1878).

Herpestes mungo, Flower, P.Z.S., 1900, p. 331; Kloss, Journ. F.M.S. Mus., II, p. 148 (1908); id. Journ. Straits Branch Roy. Asiat. Soc., No. 53, p. 27 (1909).

This animal is supposed to have been introduced from India into Province Wellesley by European planters: it is apparently the typical form from Bengal with slightly ferruginous face and feet and buff under-fur [*vide* Wroughton, Journ. Nat. Hist. Soc. Bombay, XXIV, p. 51 (1915)] but should it prove different Cuvier's name will apply.

The F.M.S. Museums have examples from the district of Larut, Perak, which is adjacent to Province Wellesley, and also a specimen from Kuala Lumpur, Selangor.

Measurements of a female from Taiping, Perak (No. 954/11):—Head and body, 373; tail, 282; hind-foot, 71; ear, 29 mm.

MUNGOS URVA (Hodgs.).

This species has not hitherto been recorded from the Peninsula. It is represented by two examples—an immature female (permanent canines just appearing) and a juvenile male from Trang, Siamese Malaya, obtained in January 1910: they are indistinguishable, on descriptions, from Himalayan and Indo-Chinese animals.

Measurements of the female (No. 1218/10):—Head and body, 451; tail, 260; hind-foot, 96; ear 32.5. Skull: greatest length, 91; greatest breadth, 48 mm.

MUNGOS BRACHYURUS (Gray).

Herpestes brachyurus, Gray, Mag. Nat. Hist. (N.S.), I, p. 578 (1837); Cantor, Journ. Asiat. Soc. Bengal, XV, p. 143 (1846); Anderson, Zool. Researches, p. 187 (1878); Flower, P.Z.S.

1900, p. 332: Kloss, Journ. F.M.S. Mus. II, p. 148 (1908); id. Journ. Straits Branch Roy. Asiat. Soc. No 53, p. 28 (1909).

Described originally as coming from "Indian Islands," Borneo, may be accepted as the typical locality: the species occurs also in Sumatra. We have no topotypes with which to compare the Malayan animal but it does not seem to differ.

Specimens are in the F.M.S. Museums from Taiping, Perak, and Kuala Lumpur, Selangor.

Measurements of an adult female from the former place (No. 124/14). Head and body, 412; tail, 239; hind-foot, 86; ear 29.5 mm. Skull, greatest length, 99; greatest breadth, 50 mm.

MUNGOS JAVANICUS PENINSULAE, Schwarz.

Herpestes javanicus, Cantor, Journ. Asiat. Soc. Bengal, XV, p. 241 (1846); Anderson, Zool. Researches, p. 185 (1878); Flower, P.Z.S. 1900, p. 332; Bonhote, P.Z.S. 1900, p. 873; Kloss, Journ. F.M.S. Mus. II, p. 148 (1908); id. Journ. Straits Branch Roy. Asiat. Soc., No 53, p. 28 (1909).

Mungos exilis peninsulae, Schwarz. Ann. & Mag. Nat. Hist. (8) VI, p. 231 (1910).

The typical locality of *peninsulae* is Bangkok and the range is given as "Malay Peninsula and Lower Siam." Members of the species from Cochin-China and Annam, which are *exilis* Gerv., are stated by Bonhote (P.Z.S., 1907, p. 6) to differ "in their much redder colour from Siamese specimens..... in their much deeper colour from Javanese specimens." To me it appears well to regard animals from all these places as races of *javanicus* (Desm.)

We have no topotypes of *peninsulae* but two animals from the vicinity of Taiping, Perak, appear to be referable to it though their tails are without any dark tip.

Measurements of an adult male (No. 971/13):—Head and body, 364 (371)¹; tail, 276 (254); hind-foot, 57 (63); ear, 23 (25). Skull:—greatest length, 78.0; basilar length, 69.8; palatilar length, 37.2; length of upper tooth row, *c-m*² (alveoli), 26.6; *pm*⁴, length 7.0, greatest diameter, 7.8; rostral breadth across roots of canines, 13.8; post-orbital constriction, 11.0; breadth of braincase 26.0; zygomatic breadth, 39.2 mm.

MUNGOS PERAKENSIS, *sp. nov.*

Type:—Adult female (skin and skull), F.M.S. Mus. No. 116/14. Collected at Assam Kumbang, near Taiping, Perak, on 14th February, 1912, by F. Seimund.

Characters:—Like *M. j. peninsulae* (antea) but smaller; about the same size as *M. birmanicus* (Thos.) of Burma, *M. rubrifrons* Allen, of Hainan and *M. siamensis* Kloss, of Siam.

¹ Measurements in parentheses those of the second adult male (No. 955/11).

Colour :—Pelage a grizzle of blackish and buff, base of hair dark brown on back, blackish on abdomen. Top of muzzle blackish; top of face and head dark rufous, finely grizzled; lower cheeks ferruginous; median line of back faintly tinged with rufous; fore and hind feet darker and more finely annulated than the body; chin yellowish rusty; undersides of body and limbs less speckled than the back.

Skull and teeth :—Do not differ from *M. birmanicus* or *siamensis*.

Measurements :—Head and body, 316 (328)¹; tail 236 (253); hindfoot, 58 (54); ear, 24 (24). Skull: greatest length, 69.5; condylo-basal length, 67.3; palate length 36.0 (32.2); upper molar row $c-m^2$ (alveoli) 24.5 (24.8); pm^4 , length 6.8 (6.9), greatest diameter, 7.2 (7.5); rostral breadth above canines, 12.3 (11.7); zygomatic breadth, 33.7 (31.5) mm.

Remarks :—The small size of this species immediately distinguishes it from *M. j. peninsulac* though its colour is almost exactly similar; the dark rufous head separates it from *birmanicus* and its darker colour in general from *siamensis*.

MUNGOS INCERTUS, *sp. nov.*

Type :—Male skin collected at Ongut, Trang, Siamese Malaya on 3rd February, 1910.

Diagnosis :—Intermediate in size between *M. peninsulac* and *M. perakensis*: pelage longer than in either; head brighter; colour generally rather more rufous, pale annulations coarser; underside of body dull ochraceous, very slightly speckled; base of tail rather ochraceous below.

Measurements :—Head and body, 350 (361)²; tail, 276 (265); hindfoot, 63 (62); ear, 20 (22) mm.

Remarks :—I do not know of any species of which this animal is the Malayan representative; it appears to be too large for *M. birmanicus*, etc. Probably belonging to it are two old mounted specimens in the Museums from Perak which I have recorded as *Herpestes auro-punctatus birmanicus* (Journ. Straits Branch Roy. Asiat. Soc. No. 53 p. 28, 1909) but it is impossible to say with certainty as they have suffered from exposure and no measurements have been recorded.

¹ Measurements in parentheses those of a young adult female from the same locality (No. 116/14).

² Measurements in parentheses those of a female from near Taiping, Perak. (No. 68/17).

XX. ON TWO NEW PYGMY SHREWS FROM THE MALAY PENINSULA.

By C. BODEN KLOSS, F.Z.S.

CROCIDURA GRAVIDA, *sp. nov.*

Type (and only specimen examined):—Adult male (skin and skull), F.M.S. Mus. No. 79/17. Collected on Pulau Dayang Bunting,* Langkawi Islands, West Coast Malay Peninsula, on 8th Dec. 1916, by H. C. Robinson.

Diagnosis:—About the same size as *C. klossi*, Robinson, of the Redang Islands, Trengganu (*C. major*, Kloss, preoccupied)† but tail longer and colour much less brown: the greyest of all the known shrews from the Peninsula region. Colour not to be exactly matched by any of Ridgway's examples (Colour Standards and Nomenclature) but nearest to dark Quaker drab, with a tinge of brown strongest anteriorly; rather paler below.

Measurements:—See table on p. 128.

CROCIDURA TIONIS, *sp. nov.*

Type:—Adult female (skin and skull) F.M.S. Mus. No. 881/15. Collected on Tioman Island, East Coast Malay Peninsula, on 1st July, 1915, by H. C. Robinson.

Diagnosis:—About the same colour as *C. klossi* but smaller; about the same size as *C. negligens*, Robinson and Kloss, of Koh Samui near Bandon, East Coast Malay Peninsula‡ but browner. General colour effect of upper parts Benzo brown (Ridgway), the hairs having deep neutral grey bases and brown tips: below paler and nearly neutral grey slightly tinged with brownish mesially.

Measurements:—See table on p. 128.

Specimens examined:—Five, all from the type locality

* Pregnant Damsel Island.

† Ann. and Mag. Nat. Hist. (8) vii, p. 117 (1911); Journ. F. M. S. Mus., iv, p. 194 (1911).

‡ Ann. and Mag. Nat. Hist. (8) xiii, p. 232 (1914); Journ. F. M. S. Mus., v, p. 133 (1914).

MEASUREMENTS OF NEW SPECIES OF *Crocidura* in millimetres.

| Species | Body. | | | | SKULL | | | | | | | No | | |
|--------------------------|-------|---------------|------|-----------|-------|-----------------|--------------|----------------|---------------------------------------|------------------------------|-----------------------------|------|-----------------|--------------------------------------|
| | Sex | Head and body | Tail | Hind foot | Ear | Greatest length | Basal length | Palatal length | Maxillary tooth row including incisor | Lachrymal breadth of rostrum | Greatest breadth of rostrum | | Mastoid breadth | Length of mandible including incisor |
| <i>O. gravida</i> , Type | ♀ | 93 | 54 | 16 | 11 | 22.0 | 21.0 | 10.7 | 11.0 | 4.6 | 7.1 | 9.9 | 16.0 | 79/17 |
| | ♀ | 90 | 62 | 15 | 10 | | | 9.4 | 10.0 | 4.2 | 7.0 | | 15.0 | 665/16 |
| <i>O. ttonis</i> | ♀ | 57 | 62 | 14 | | | | 9.1 | 9.5 | 4.0 | 6.6 | | 14.1 | 720/16 |
| | ♀ | 86 | 68 | 15 | 8.5 | 21.5 | 19.2 | 9.1 | 9.7 | 4.2 | 6.9 | 9.4 | 14.8 | 880/15 |
| | ♀ | 92 | 65 | 15 | 8 | 21.6 | 19.0 | 9.2 | 9.3 | 4.4 | 7.0 | 10.0 | 14.1 | 881/15 |
| | ♂ | 92 | 72 | 16 | 9 | 21.8 | 19.2 | 9.7 | 10.0 | 4.3 | 7.0 | 9.9 | 14.5 | 882/15 |

XXI. ON A COLLECTION OF BIRDS FROM PULAU LANGKAWI AND OTHER ISLANDS ON THE NORTH-WEST COAST OF THE MALAY PENINSULA.

By HERBERT C. ROBINSON, *C.M.Z.S., M.B.O.U.*

The present paper is based mainly on a collection made by Mr. Seimund and myself and a staff of native collectors on the principal islands off the north-west coast of the Malay Peninsula between the parallels of 6° N. and 7° 30' N. during the months of December and January, 1916-17.

The islands had for the most part been visited by us previously for two or three days at a time and I have in many cases included species obtained on these occasions where the specimens have raised points of any interest. Many species on the other hand, notably hawks and herons, which have been sufficiently dealt with elsewhere are not here mentioned.

The collections are probably fairly exhaustive for the islands of Langkawi and Terutau but are of course very incomplete, for the other islands, which were only visited for two or three days at a time, merely sufficiently long to obtain representative series of the small mammals which were the main objects of our visits.

It will be seen that the avifauna presents the same general characters as those of all the other groups of islands in the vicinity of the Malay Peninsula, namely, a great scarcity of all the more strictly jungle frequenting species belonging to the great family of *Timeliidae*, and the total absence of *Eurylaemidae*, though we find a few species of Trogons, Barbets and Woodpeckers orders which are entirely absent from the islands off the coast of Pahang on the east side of the Peninsula, these islands being smaller in extent and separated from the mainland by broader stretches of deeper water. Owing to the fact that our visit took place in the winter months, migratory flycatchers, thrushes and warblers are well represented, while a considerable number of shore birds were also obtained or observed.

A brief account of the localities visited on the present cruise is appended, while the synonymy has been restricted to narrow limits, only two papers which have some bearing on the localities being usually quoted viz :—

“On birds from the Northern Portion of the Malay Peninsula including the Islands of Langkawi and Terutau; with notes on other rare Malayan Species from the Southern Districts.” By Herbert C. Robinson and Cecil Boden Kloss.

Ibis 1910, pp. 659-675, Plate X, and text figure 6, *Ibis* 1911, pp. 10-80, Pl. 1, and text figures 5 and 6, quoted as "Robinson & Kloss."

"Zoological Results of the Swedish Zoological Expeditions to Siam 1911-1912 and 1914-1915, IV, Birds. 11," by Nils Gyldenstolpe.

Kungl. Svenska Vetenskapsakademiens Handlingar. Band. 56, No. 2, 1916, quoted as "Gyldenstolpe."

PULAU PAYA. A small rocky island, covered with jungle and without regular inhabitants, about two hundred and fifty feet high, situated about sixteen miles west of the mouth of the Kedah River in Lat. $6^{\circ} 3'$, N. and Long. $100^{\circ} 3'$ E. and separated from the mainland by depths of fifteen fathoms. The island is about a mile in maximum length and about a third of a mile in breadth. It has been visited by us several times, on the last occasion at the end of April 1915, but no birds of any great interest have been obtained on it.

A fruit bat (*Pteropus hypomelanus geminorum*, Miller), only known elsewhere from the Mergui Archipelago, was found to be abundant on it (c.f. Kloss, *antea*, Vol. VI, p. 245 (1916).

PULAU LANGKAWI. This island, with those immediately adjacent to it, is contained in an area roughly shaped as an equilateral triangle with a side of somewhat over twenty miles between the Latitudes $6^{\circ} 9'$, and $6^{\circ} 27'$ N. and Longitude $99^{\circ} 38'$ and $99^{\circ} 56'$, E, separated from the mainland by a strait ten miles wide at the narrowest part and by depths not exceeding ten fathoms.

The island is extremely rugged in character, though in the neighbourhood of the two principal villages, Kwah and Kuala Malacca, there are considerable areas of flat land devoted to orchards, rice and coconuts and of late years to the inevitable rubber. There is also a large amount of cultivation on the north coast, where a fairly dense population is settled.

Elsewhere the country is very mountainous, the highest hill, Gunong Raya, reaching nearly 3,000 feet, while there is a range of precipitous mountains at the north-west corner well over two thousand feet in height. On the present occasion we spent from the 12-15th December at a place called Burau at the foot of this range, where however no birds of any great interest were obtained.

The geological formation of Langkawi is by no means so generally limestone as is usually assumed and much granite, quartzite, sandstone and other metamorphic rocks also occur. Most of the smaller islets of the group and many of the larger ones are, however, exclusively limestone and it is on these that the many peculiar species of plants belonging to the Langkawi flora are almost entirely to be found though the forest flora generally appears to differ greatly from that of the southern part of the Malay Peninsula. A considerable collection of plants was made at Burau, but here as

elsewhere we were unfortunate in finding most species out of flower.

DAYANG BUNTING. A small island forming part of the Langkawi group, mainly, though possibly not entirely, of limestone, which in several places attains the quality of marble, white and even in grain, almost saccharine, resembling that found at Lenggong in Upper Perak and decidedly superior to that of the Ipoh Quarries. The island is quite uninhabited and covered with jungle and is nearly everywhere steep-to, though several deep indentations and the heads of bays are filled with mangrove.

The chief point of interest in the island is the fresh water lake which at two places approaches to within a few yards of the shore and is separated from it by a narrow rocky rim of no very great height so that the surface of the lake is probably only a few feet above the level of the sea. In shape it is a long oval 5-600 yards across by 1,100 or 1,200 yards long and is about $4\frac{1}{2}$ -5 fathoms deep close to the shore, deepening to 8 in the centre and nowhere exceeding $8\frac{1}{2}$, the depths being fairly regular. The bottom is in places rock but mostly mud. There seems to be only one species of fish in the lake and no fresh water sponges were found round the edges or on twigs and logs afloat in the lake. There is good anchorage near the island at the head of a fiord leading to the best approach to the lake, which however is much encumbered with coral knobs at its head. Fresh water escapes freely through the sand and rocks of the shore and large quantities of excellent quality can be obtained at all seasons by the use of a hose.

With the exception of mousedeer most of the mammals occurring on the main island of Langkawi occur on this one also; no fruit bats were seen and other species were scarce.

Land birds were exceedingly scarce, the only common species being *Cyornis sumatrensis*. There were not many insects about and the few butterflies obtained were of no special interest. A Cicada was heard and sand-flies were only too common.

We did not actually see any *biawak* (*Varanus* sp.) though they must occur. Four species of *Draco* were very common and we secured one young *Calotes versicolor* and three species of skinks. We also collected three species of frogs of which one was very common at the edge of the lake.

At a considerably higher level than the large lake, the Dyaks came across another pool, much smaller and largely choked with dead and fallen timber. The natives are aware of its existence and state that in the dry season it contains no water at all.

In addition to the zoological collections about 60 species of plants were secured but seem to be of no very great interest. Few of the rock plants were in flower. Orchids

were scarce and *Gesneraceae*, for which we came specially to look, were not conspicuous or interesting and were almost entirely out of flower.

PULAU TERUTAU. Pulau Terutau lies north of Langkawi, from which it is separated by a channel about five miles in breadth. I have little to add to the brief account of the island given by Mr. Kloss and myself in the *Ibis* for 1910, pp. 666 et seq.

During our stay on the present visit, which lasted from 17—29th December we circumnavigated the island and landed at several spots on the western shore which is very bold and exposed though there are three large shallow bays with fine beaches. The island is even more sparsely inhabited than it was in 1907 and 1908, but a good deal of timber cutting takes place at intervals. The collections of birds were neither large nor of any great importance but we obtained a number of mammals which were special desiderata of the Museum, including the rare *Petaurista terutaws*, hitherto known only from the type, and a new species of *Arctogalidia*.

KOH LIBONG or PULAU TELIBUN. Situated between Lat. $7^{\circ} 12'$ and $7^{\circ} 18'$. N. and Long $99^{\circ} 31'$ and $99^{\circ} 27'$, this island is roughly an equilateral triangle in shape with sides of about six miles. One face is high and rocky with a sandy shore, the maximum height being put in the charts at about 1,450 feet, though this estimate is probably excessive. The high land, which is on the western face, is comparatively narrow and the rest of the island is low and flat, there being a good deal of mangrove in places while further inland there are sandy flats and grassy plains overgrown with *gelam* (*Melaleuca*), several species of tall grass (though *lalang* is quite absent) and a variety of prickly shrubs. The high land is covered with jungle though in places where this has been cleared for hill rice and the like, the landscape has assumed a park-like aspect, very pleasing to the eye after the monotony of the jungle of the southern islands, though by no means so pleasant to traverse. The jungle is open and the undergrowth consists largely of a species of palm, with fan shaped leaves, growing to about fifteen feet in height. Epiphytes generally were scarce and orchids, in contrast to the islets off Terutau and Langkawi, are by no means numerous. In fact the botany generally was of no great interest, doubtless due to the fact that there had been but little rain for some time prior to our visit and few plants were consequently in flower, the most attractive being a small *Begonia* with rose-pink flowers which grew on damp rocks on the shore, barely above tide marks.

The flat portion of the island being unsuitable for collecting upon and water being there scarce and indifferent in quality, we anchored in a small bight off the N.W. corner of the island where there was a small stream of excellent water and a fine, sandy beach backed by good jungle. We

collected here from December 31st to January 4th, and besides the mammals actually secured, which will be dealt with later, obtained evidence of the existence of a form of *Cervus equinus* (rusa) which is very dark in colour and of a species of *Paradoxurus* (musang).

A very small bat, probably an *Emballonura*, was seen round a flowering tree after dark, while the *orang laut* or coast aborigines told us that there were many of the larger *kluang* (*Pteropus*) among the mangroves at certain times of the year, though none were to be found at the time of our visit.

Neither Pig, Mouse deer or the Lotong (*Pithecius obscurus*) are found on the island.

The strait separating the island from the mainland is barely a mile wide at its narrowest part and carries less than ten feet of water at low tide and it is therefore at first sight surprising that the island forms of the mammals should differ to the extent that they undoubtedly do from the mainland stocks. It seems probable, however, that the lower land forming the eastern part of the island is of very recent formation and that Telibun, in times geologically very recent was separated from the mainland by a deeper and wider strait than is at present the case.

Birds, as our lists show, were few in number and not particularly interesting in species.

From the evidence of the rocks on the shore it would appear that the island is in part composed of sandstones and other similar formations though many of the higher peaks seem to be limestone.

KOH MUK OR PULAU MUNTIA. A small island, roughly circular or quadrangular in shape, about 6 miles NNW. of Telibun and separated from it and the mainland by depths not exceeding four fathoms. The WNW. and SW. parts of the island consist of precipitous limestone bluffs coming down sheer into the sea, the maximum height of the island being about a thousand feet. The E. and SE. sides however, are low and sandy and there is good anchorage for small craft in the SE. bay in about three fathoms. The western face is much fissured by caves, some of considerable size, in which esculent swallows breed in great numbers while others are inhabited by bats (*Taphozous melanopogon fretensis*, Thomas). Some of these caves appear to have been used as places of sepulture, as we came across fragmentary human bones in more than one of them, but this fact has already been noted by Annandale who has described skeletons collected by him in the vicinity.

At the time of our visit from 4-8th January 1917, there having been little rain for over six weeks, the island was deficient in good water. There are several *orang laut* clearings on the eastern side of the island, which is much frequented for fishing purposes and for the collection of beche-de-mer or trepang

(*Holothuria* spp.) which is extraordinarily abundant in the sandy bays in from three to five fathoms.

Besides the species of mammals actually obtained the *kra* monkey, *Macaca irus*, is fairly common, while Seimund came across a large specimen of *Felis temmincki*, feeding on a big hawk. Our *orang laut* pilot showed us a cranny in the rocks in which this "rimau" regularly bred. Tracks of otter were also noted in abundance.

Birds were more numerous than on most of the other smaller islands visited by us, especially green pigeon and the very handsome woodpigeon, *Columba punicea*.

KOH KADAN or PULAU PAPAN. A long, narrow island, about two miles long by a quarter to half a mile broad, about eight miles WNW. of the northern end of Pulau Telibun and about five miles SW. of Pulau Muntia. The island is wooded, about 200 feet high, with a sandy beach on the eastern side but steep-to on the western, with a long reef extending for four or five miles from its southern extremity. We spent one night only there 7-8th January 1917, and found nothing of any interest, the only mammal being a race of *Epimys rattus* and the only land birds, Crows and Koels (*Eudynamis malayana*).

KOH KYAN or PULAU NIOR, S'TALI and KOH NGAI or PULAU KUDA. Two precipitous limestone islets about five miles due north of Pulau Papan and about four miles west of Pulau Muntia. They are thin clothed with vegetation, the trees being largely species of *Ficus* and other epiphytic forms and at certain times of the year are said to be frequented by myriads of White Imperial Pigeon (*Myristicivora bicolor*) though at the time of our visit in January the only land birds on them were swallows (*Hirundo javanica*) and species of *Collocalia* and *Cypselus*. Pulau Kuda however was inhabited by enormous numbers of a small species of *Pteropus* which hung in clusters to the cracks in the vertical cliffs and to the branches of the small stunted trees growing therefrom.

PULAU LONTAR. A large island about sixteen miles long by four miles wide, situate between latitude $7^{\circ} 29'$ and $7^{\circ} 44'$ N. and Longitude $99^{\circ} 2'$ and $99^{\circ} 7'$ E. On the western side it is steep to, but on the east there are plains of considerable extent. In the middle it is divided by a shallow strait broadly bordered with mangrove. In the centre the land rises to a considerable altitude, certainly over a thousand feet, and is covered with jungle, which however has been much cut out for temporary cultivations.

The population is considerable, mainly Samsams *i.e.* of mixed Malay-Siamese stock with a strong infusion of *orang laut*. We spent a few days anchored off the principal village, a place of some size with numerous Chinese shops, known as Pasir Raja. The coast however in this vicinity is fronted by a broad bank of very soft mud which is only passable at half tide by small boats, though a jetty some three hundred yards in length traverses part of it.

During our stay from January 9-12th, a very strong easterly wind, which only dropped for a few hours in the early morning, forced us to lie under the lee of a small island, Pulau Depok, some three miles distant from the settlement, and on several occasions we were nearly swamped in getting to and leaving the main island.

We obtained a large series of mammals including a lotong and a kra, a mousedeer, musang and tangelin, and rats and squirrels of several species.

Such birds as were obtained show that the fauna is of mainland rather than insular facies as the occurrence of such genera as *Calorhamphus* and *Phyllornis* indicates. Peafowl are said to occur though we did not obtain any, Buffalo, both feral and domesticated are common, and tiger are occasionally met with while serow (*Nemorrhoedus*) are abundant on a limestone island between Pulau Lontar and the shore. The main island appears to have but little limestone on it while Pulau Depok, near which we were anchored, was of sandstone, but many islets in the vicinity, especially to the NE., were of the characteristic limestone formation.

1. *TRERON CURVIROSTRA NIPALENSIS* (Hodgs.)

Treron nipalensis *Salvad. Cat. Birds Brit. Mus.* xxi, p. 34 (1893); *Robinson and Kloss*, p. 674; *Robinson, antea*, vol. V, p. 141.

Treron curvirostra nipalensis, *Baker. Indian Pigeons and Doves*, p. 66, pl. 5 (1913); *Robinson, Ibis*, 1915, p. 721; *Gyldenstolpe*, p. 153.

a. ♂. vix ad. W. side Pulau Telibun, Trang, S.W. Siam, 31st December, 1916. [No. 3797.]

"Iris dull blue, inner ring pink, orbits verditer green, bill yellow, the base crimson, feet crimson."

Fairly common both on this island, Langkawi and Terutau, though these latter specimens as also birds from Trang, are decidedly nearer the typical *T. curvirostra curvirostra* from Sumatra.

2. *OSMOTRERON VERNANS* (Linn.)

Salvad. tom. cit. p. 60; *Robinson and Kloss*, p. 674; *Robinson, antea*, vol. V, pp. 88, 140; *Robinson, Ibis*, 1915 p. 723.

a. ♂. Lem Pia, north side Telibun Straits, Trang, S.W. Siam. 3rd January, 1917. [No. 3835.]

b. c. ♂, ♀. Telok Wau, Terutau, 24--28th. December, 1916. [Nos. 3725, 3773.]

"Iris outer ring pink, inner blue, feet pinkish maroon, bill greenish grey."

Very common on all the islands and on the adjacent mainland.

3. CARPOPHAGA AENEA AENEA (Linn.).

Salvad. tom. cit. p. 190; *Robinson, antea*, vol. V, p. 141 (1915); *Robinson, Ibis*, 1915, p. 723; *Gyldenstolpe*, p. 155.

a. ♀. Telok Wau, Terutau. 24th December, 1916.
[No. 3731.]

b. ♂. Koh Muk (Pulau Muntia, Trang, S.W. Siam,
7th January, 1917. [No. 3910.]

"Iris dark red, bill slate, feet maroon."

The Bronze Imperial Pigeon was fairly common in all the islands at the time of our visit but hard to get, as it was not fighting and always flew extremely high. The pair preserved are distinctly larger than those obtained in S.E. Siam by Mr. Kloss; wing 235 mm. against 209, but several names are available both for the eastern and southwestern races, if separated. All the Malayan birds belong to the typical Linnean race, whose type locality has been designated by Hartert as the Lesser Sunda Islands.

4. COLUMBA PUNICEA (Tick.).

Columba punicea, *Salvad. tom. cit.* p. 306; *Robinson and Kloss*, p. 674.

Alsocomus puniceus, *Stewart Baker, Indian Pigeons and Doves*, p. 176, Pl. 18 (1913); *Gyldenstolpe* p. 151.

a-c. 2♂, ♀. Koh Muk (Pulau Muntia), Trang, S.W. Siam. 4-5th January, 1917. [No. 3841, 2, 3858.]

"Iris, inner ring yellow, outer orange shading into the inner ring, orbits plum, bill plum at base, whitish horn at tip, feet pinkish maroon.

Two of these birds sexed male have the cap, pale pearly white very sharply defined, the bird marked female having it dull slate. A specimen from Terutau however which is sexed female in all respects resembles the males so that Stewart Barker is probably correct in his statement that the sexes, when fully adult, are identical in colouration. One male has the undersurface amethystine grey, not a somewhat vinaceous chestnut as in the other specimens.

This magnificent pigeon was very common on Koh Muk during the three days we were there, though they only appeared at dusk, probably from the adjacent mainland, roosting in tall mangroves a little way back from the beach in parties of thirty or forty. As Bingham describes it, the note is a booming coo somewhat like that of *Carpophaga aenea* but not nearly so loud or deep.

5. STREPTOPELIA SURATENSIS TIGRINA (Temm.)

Turtur tigrinus (Temm. and Knip.) *Salvad. tom. cit.* p. 440; *Robinson and Kloss*, p. 675; *Robinson, antea*, vol. V, pp. 88, 142.

Streptopelia suratensis tigrina, *Stewart Baker, Indian Pigeons and Doves*, 121, pl. 11 (1913); *Robinson, Ibis*, 1915, p. 724; *Gyldenstolpe*, p. 149.

a. ♀. Pasir Raja, Pulau Lontar, S.W. Siam. 11th January, 1917. [No. 3883.]

"Iris pinkish yellow, orbits dirty white, bill dark blackish horn, feet dull lake."

Very common on Pulau Lontar, also on open spaces on Koh Muk and Pulau Terutau and extraordinarily abundant along the coast of Trang.

Wing 145 mm. slightly larger than most southern specimens.

6. *GEOPHELIA STRIATA* (Linn.)

Salvad. tom. cit. p. 458; *Ogilvie Grant, Fascic. Malay Zool.* iii. p. 121 (1905). *Gyldenstolpe*, p. 150.

a. ♂. Pasir Raja, Pulau Lontar, S.W. Siam. 12th January, 1917. [No. 3901.]

"Iris white, orbits yellowish green, bill bluish slate, feet pinkish violet."

Williamson and others have remarked that this little dove is very rare in Siam proper. It is however common over practically the whole of the Peninsula to its northern extremity in suitable localities. We did not however observe it on Langkawi and Terutau, though I have little doubt that it occurs on the large open areas on the north of the former island.

7. *CHALCOPHAPS INDICA* (Linn.)

Salvad, tom. cit. p. 514; *Robinson and Kloss*, p. 675 *Robinson, antea*, vol. V, pp. 88, 141 (1915), *Gyldenstolpe*, p. 150.

a. ♂. Sungei Udang, Terutau. 8th March, 1909. [F.M.S. Mus. No. 439/09.]

Evidently not very common on the group as the above specimen is the only one that has been obtained in the course of our visits to the islands.

8. *RALLINA FASCIATA* (Raffles).

Sharpe, Cat. Birds Brit. Mus. xxiii, p. 75 (1894); *Robinson, antea*, vol. V, p. 88 (1915).

a. ♂. Pulau Terutau. November 1st 1913.

Found abundantly in the adjacent states of Perlis and Kedah in October and November, 1911, but very much rarer in the more southern parts of the Peninsula.

9. *RALLINA SUPERCILIARIS* (Eyton).

Sharpe, tom. cit. p. 76; *Robinson and Kloss*, p. 10; *Robinson, antea*, vol. VI, p. 225 (1916).

- a. ♀. Ulu Malacca, Pulau Langkawi, 17th February, 1909. [F.M.S. Mus. No. 445/09.]

Very much rarer than the preceding species.

10. AMAURORNIS PHOENICURA CHINENSIS (Bodd.).

Stresemann, Nov. Zool. xx, p. 304 (1913); *Robinson, antea*, vol. V, p. 141 (1915); *id. Ibis*, 1915, p. 725; *Gyldenstolpe*, p. 148.

Amaurornis phoenicura, *Sharpe, tom. cit.* p. 156; *Robinson & Kloss*, p. 11.

- a. ♂. Kuala Kubong Badak, Pulau Langkawi, 17th March, 1909. [F.M.S. Mus. No. 444/09.]

Wing, 162 mm.

11. ARENARIA INTERPRES (Linn.).

Sharpe, tom. cit. p. 92.

Strepsilas interpres, *Ogilvie Grant. Fascic. Malay. Zool.* iii, p. 119 (1905).

- a. ♂. Koh Muk (Pulau Muntia) Trang, S.W. Siam. 4th January, 1917. [No. 3846.]

"Iris dark hazel, bill greenish black, legs yellowish orange."

The Turnstone is by no means a common bird on the Malayan coasts and few specimens are on record, though it occasionally occurs in large flocks.

12. SARCOGRAMMUS INDICA ATRINUCHALIS (Jerdon).

Sarcogrammus atrinuchalis, *Sharpe, Cat. Birds Brit. Mus.* xxiv, p. 152 (1896); *Robinson and Kloss*, p. 11; *Robinson, antea*, vol. V, pp. 88, 142.

Sarcogrammus indica atrinuchalis, *Robinson, Ibis*, 1915, p. 725; *Gyldenstolpe* p. 142.

- a. ♀. Telok Wau, Terutau. 17th December, 1916. [No. 3651.]

"Iris hazel, bill and wattles pale crimson, anterior half of bill black, tarsi pale yellow."

Very common throughout the northern half of the Peninsula extending further to the south on the Eastern side, and along the Pahang River, possibly because there is more open ground, suitable for the species in these districts.

13. SQUATAROLA HELVETICA (Linn.) •

Sharpe, tom. cit. p. 182.

Squatarola squatarola, *Gyldenstolpe*, p. 143.

- a. ♀, Koh Muk (Pulau Muntia) Trang, S. W. Siam. 5th January, 1917. [No. 3857.]

The Grey Plover is not such a rare visitor to the coasts of Siam and the Malay Peninsula as *Gyldenstolpe's* note would

imply. It can generally be met with in Klang Straits during the months November to February and has also been noted at numerous other localities between Malacca and the Kedah River.

14. *OCHTHODROMUS MONGOLUS PYRRHOTHORAX* (Gould).

Ochthodromus pyrrhorthorax, *Sharpe, tom. cit.* p. 226; *Robinson and Kloss*, p. 12, *Robinson, antea*, vol. V, p. 142 (1915).

Aegialitis mongolicus, *Ogilvie, Grant. Fascic. Malay. Zool.* iii, p. 118 (1906).

Ochthodromus mongolus, *Gyldenstolpe*, p. 144.

a-b. 2 ♀. Koh Muk (Pulau Muntia) Trang, S. W. Siam. 4th January 1917. Nos. 3843, 4.

"Iris dark hazel, bill black, feet dirty slate."

I am doubtful if the typical race of this plover, for this form is not more than a subspecies, is ever found west of North Borneo. I have certainly, with one very doubtful exception, seen none from any part of the Malay Peninsula, all being referable to the present race which, as Sharpe points out, has a slightly longer tarsus.

15. *AEGIALITIS ALEXANDRINA PERONI* (Bp.)

Aegialitis peroni (Bp.); *Sharpe, tom. cit.* p. 274; *Gyldenstolpe*, p. 144.

Aegialitis alexandrina, *Robinson, antea*, vol. V, p. 142; vol. VII, p. 70 (1916).

a-b. ♂ ♀ ad. Burau, N. W. Langkawi, 23rd April, 1911.

c. ♀. W. side Pulau Telibun, Trang, S. W. Siam. 2nd January, 1917. [No. 3815.]

"Iris dark hazel, bill black, feet slate."

Until *Gyldenstolpe*, (*loc. cit.*) identified a pair of plovers obtained at Koh Lak in Peninsular Siam as this species I had hitherto regarded our fairly considerable series as a tropical resident race of *Ae. alexandrina*, which indeed it is.

Seven males from various parts of the Peninsula have a wing of 93-99 mm. and eight females 93-100 mm.

A series from Borneo, the loan of which we owe to the kindness of the Sarawak Museum authorities has the wing in four males 91-94 mm. and in three females (one very worn) 88-94 mm. so that the Peninsular race would appear to be slightly larger. In addition the Peninsular birds have the dark loreal streak much less strongly developed, while the feathers of the mantle are somewhat paler with lighter edgings; the white at the base of the inner primaries is also more extensive. Material from Java and from Timor, which is probably the typical locality, is however required before the mainland race can safely be separated.

Chicks in down, with the parents, were obtained at Tanjong Tombak, Pulau Bintang, Rhio Archipelago on 5th June, 1908.

16. *TEREKIA CINEREA* (Guldenst.)

Sharpe, tom. cit. p. 474; *Robinson and Kloss*, p. 13.

a. ♂. Kuala Kubong Badak, Langkawi, 18th March, 1909.

b. ♀. Telok Apau, Pulau Langkawi, 14th December, 1912.

Very common everywhere along the coast, wherever there are suitable feeding grounds, during the winter months.

17. *TOTANUS CALIDRIS*, Linn.

Sharpe, tom. cit. p. 474; *Robinson and Kloss*, p. 12; *Robinson, Ibis*, 1915, p. 725; *Gyldenstolpe*, p. 145.

a. ♂. Telok Apau, Langkawi. 11th December, 1912.

Very common also at Koh Muk (Pulau Muntia) in January, 1917.

18. *TRINGOIDES HYPOLEUCOS* (Linn.).

Sharpe, tom. cit. p. 456; *Robinson and Kloss*, p. 13; *Robinson, Ibis*, 1915, p. 725; *Gyldenstolpe*, p. 146.

a. ♂. W. side Pulau Telibun, Trang, S. W. Siam. 2nd January, 1917. [No. 3816].

"Iris dark, bill greenish slate, feet slate darker at the joints."

Common everywhere in the Peninsula in suitable localities.

19. *GLOTTIS NEBULARIUS* (Gunn.).

Sharpe, tom. cit. p. 481; *Robinson and Kloss*, p. 13; *Robinson, Ibis*, 1915, p. 725; *Gyldenstolpe*, p. 146.

a. ♀. Koh Muk (Pulau Muntia) Trang, S.W. Siam. 4th January, 1917. [No. 3836].

"Iris hazel, bill grey, feet greenish grey, darker at joints."

The Greenshank is common in suitable localities throughout the coasts of Siam and the Malay Peninsula though not so abundant and very much shyer than the Redshank.

20. *RHYACOPHILUS GLAREOLA* (Gm.).

Sharpe, tom. cit. p. 491; *Robinson and Kloss*, p. 13; *Gyldenstolpe*, p. 146.

a. ♀. Pulau Langkawi. 11th February, 1909 [F.M.S. No. 333/09.]

- b. ♂. Ulu Malacca, Pulau Langkawi. 18th December, 1912.

Not very common anywhere in the Malay Peninsula but apparently more abundant in the northern parts.

21. *GALLINAGO STENURA* (Bonap.).

Gallinago stenura, Sharpe, *Cat. Birds Brit. Mus.* xxiv, p. 619; Grant *Fascic. Malayenses*, Zool. iii, p. 117 (1906); Robinson and Kloss, *Ibis*, 1911, p. 14.

- a. ♂ ad. Langkawi Id. 10th February, 1909.

- b. ♂ ad. Langkawi Id. 18th March, 1909.

- c. ♂ ad. Langkawi Id. 25th April, 1915.

A winter visitor in very large numbers to the Malay Peninsula where also *G. caelestis* and *G. megala* are also occasionally met with.

22. *XENORHYNCHUS ASIATICUS* (Lath.).

Ogilvie Grant, *Cat. Birds Brit. Mus.* xxvi, p. 310 (1898); *Gyldenstolpe*, p. 140.

- a. ♀. North side of Telibun Straits, Trang, S.W. Siam. 1st January, 1917. [No. 3808].

"Iris chrome, orbits black, bill black, gular skin crimson lake mottled with black, lores mottled crimson and black feet deep salmon pink."

This specimen was one of a pair that frequented the shore in the neighbourhood of the seaward entrance to the Telibun Straits and which was eventually shot on a sandy lagoon near the sea. The nest, a very large and untidy structure of sticks, was built on a ledge some distance up a precipitous limestone crag. It contained four eggs, which were obtained for us by one of the local "orang laut," a primitive coast-tribe, who are very clever and daring cliff climbers. One was unfortunately broken in the descent. The remaining three were rather hard set, the shells dull or slightly glossy white, heavily pitted especially towards the smaller end. The outline is variable one being much more pointed than the other two.

Measurements.—A 71.5 × 54 mm.

B 70 × 52

C 71 × 52.5

The occurrence of the species in the Malay Peninsula has hitherto rested in three specimens from "Penang," in the British Museum, collected by Cantor. The locality given is almost certainly incorrect and the specimens must either have been aviary birds or collected on the adjacent mainland, probably in Perlis or Trang.

23. *GRAPTOCEPHALUS DAVISONI* (Hume).

Sharpe, *Cat. Birds Brit. Mus.* xxvi, p. 14 (1898); *Robinson and Kloss*, p. 17; *Robinson, antea*, vol. V, p. 89 (1915).

Sept., 1917.

(?) *Thaumatibis gigantea*, Williamson, *Journ. Nat. His. Soc. Siam*, II, p. 72 (1916).

a. ♂ ad. Pasir Raja, Pulau Lontar, S. W. Siam.
10th January, 1917. [No. 3882].

"Iris orange, crown dark indigo, occiput and ring round neck livid whitish blue, feet deep lake, bill horn."

This bird was one of a pair frequenting an open grassy plain interspersed with bushes near the sea. They were not particularly shy and with a little care were easily approached. It is evidently this species and not *Thaumatibis gigantea*, a much larger bird which was observed by Williamson at Sarahett on the Petchaburi River (*loc. cit. supra*).

Total length 802; wing 422; tail 210; tarsus 97; bill from gape 165 mm. measured in the flesh.

24. *STERNA FLUVIATILIS TIBETANA*, Saunders.

Sterna tibetana, Saunders, *P.Z.S.* 1876, p. 649; *Blanford, Stray Feath.* V, p. 485 (187); *Hume, op. cit.* viii, p. 158 (1879); *Sharpe, Hand-l. Birds*, i, p. 135 (1899).

Sterna fluviatilis, Saunders, *Cat. Birds, Brit. Mus.* XXV, p. 60, spm. f. (Selangor) (1896); *Blanford, Faun. Brit. Ind. Birds*, iv, p. 318 (1898).

Sterna longipennis, Saunders, *Cat. Birds Brit. Mus.* XXV, p. 69 (spms. u, v. w, from *Tonka and Malacca* (1896); *Blanford, tom. cit.* p. 319 (1898); *Robinson, Journ. Fed. Malay States Mus.* ii, p. 69 (1907); *id. Hand-l. Birds Malay Penins.* p. 3 (1910).

a ♀ imm. Pulau Terutau. 29th November, 1912.

This race of the European tern, *St. fluviatilis* is not uncommon in the Straits of Malacca from the end of July to January but hitherto only immature specimens have been obtained so that the identification must remain somewhat uncertain. The distinctly reddish feet of the considerable number of fresh specimens that I have examined would appear to exclude *St. longipennis*, Nordm., while the fact that the wing of the majority of Malayan birds exceeds 11 inches (275 mm.) tends to show that our birds cannot be referred to the European *St. fluviatilis fluviatilis*.

25. *STERNA SUMATRANA*, Raffles.

Sterna sumatrana, Raffles, *Trans. Linn. Soc.* xiii, p. 329 (1822); *Hume & Davison, Stray Feath.* vi, p. 403 (1878).

Sterna melanauchen, Saunders, *tom. cit.* p. 126; *Robinson, antea*, vol. V, pp. 18, 142 (1913-5).

a, b. ♂, ♀ ad. Pulau Langkawi. 27th April, 1915.
Fairly common in the seas round Pulau Langkawi.

There seems little doubt that Raffles' description of *sumatrana* applies to a young bird, little more than a nestling, of this species and that his name will therefore have to displace the generally used *S. melanauchen*.

26. *THALASSEUS BERGII PELECANOIDES* (King).

Sterna pelecanoides, King, *Survey Intertrop. and Western Coasts Australia*, ii, p. 422 (1827).

Sterna bergii, Saunders, *Cat. Birds Brit. Mus.* xxv, p. 89 (1896); Robinson & Kloss p. 11.

Thalasseus bergii edwardsi, Mathews, *Oberholser Proc. U. S. Nat. Mus.* 49, p. 520 (1915).

Thalasseus bergii pelecanoides, Oberholser, *loc. cit.* p. 523.

Sterna bergii pelecanoides, Robinson, *antea*, p. 70.

a-c. 1 ♂ nest., 2 ♀ hiem. Pulau Langkawi, February and March.

d-e. 2 ♂ nest. Pulau Terutau, March.

The specimens dated February and March, which are in full or incipient breeding plumage have the mantle decidedly darker grey than the others or than any of a considerable series in the F.M.S. Museums from the Straits of Malacca southwards to Singapore and from Tioman on the East coast of the Peninsula. The wing in the five specimens ranges from 328—355 mm. and the exposed culmen from 59—61, but the shorter winged birds as is so frequently the case in terns have the tips of the primaries abraded.

The majority of the more southerly specimens, notably those from Tioman, appear to have a larger bill, 61—64 mm. though two are smaller than any of the above specimens from Langkawi etc. measuring 56 mm.

I have in part followed Stresemann (*Nov. Zool.* XXI) in not admitting the validity of *T. b. edwardsi*, Mathews (types from Ceylon) regarding it on the strength of the above specimens from Langkawi merely as a transitional form between *T. b. velox* (Cretzsm.) from the Red sea, and *T. b. pelecanoides* (King) from Australian Seas and not worthy of even a subspecific name. In any event I think that the specimens from the extreme south of Tennasserim listed as *edwardsi* by Oberholser would in all probability be referable to *T. b. cristatus* from China if that form is to be kept distinct from *T. b. pelecanoides*, which is extremely doubtful.

27. *NINOX SCUTULATA SCUTULATA* (Raffles).

Ninox scutulata (part.) Robinson and Kloss, p. 31; *Gyldenstolpe*, p. 121.

Ninox scutulata scutulata (Raffles) *Hartert, Vog. Palaarkt. Faun.* II, p. 992 (1912).

a. ♀. Pulau Dayang Bunting, Langkawi, 8th December, 1916 [No. 3605.]

- b. ♀. Pasir Raja, Pulau Lontar, S. W. Siam, 12th January, 1917 [No. 3893.]

"Iris chrome or lemon, bill horn, cere olive green, feet pale chrome, claws greyish horn."

Examination of the fairly considerable series of Hawk Owls in the Federated Malay States Museums show that they are readily divisible into two series:

(a). A larger form with darker, duller upper surface, the head somewhat greyer than the rest of the upper parts, the white stripes on the under surface more conspicuous. The specimens are dated from October to March and therefore the race is probably only a winter visitor in the Malay Peninsula. = *Ninox scutulata scutulata* (Raffles).

(b). A smaller form with browner upper surface and no distinguishable cap; white stripes on the undersurface less conspicuous. Specimens dated from March to August and therefore, as Hartert surmises, probably a resident form = *Ninox scutulata malaccensis* (Eyton).

Specimens in the Federated Malay States Museums:—

Ninox scutulata scutulata (Raffles).

- a. ♀. Pulau Lontar, S.W. Siam. January. Wing, 216 mm.
- b. ♀. Pulau Dayang Bunting, Langkawi. December. Wing, 200 mm.
- c. ♂. Ginting Bidei, Selangor. October. Wing, 215 mm.
- d. ♀. Batang Padang, South Perak. February. Wing, 224 mm.
- e-f. ♂. Pulau Jarak, Straits of Malacca. March and December. Wing, 217, 214 mm.
- g. ♂. Pulau Jemor, Aroa Ids., Straits of Malacca. October. Wing, 214 mm.

Ninox scutulata malaccensis (Eyton).

- h-j. 2 ♂, ♀ Pulau Battam, Rhio Archipelago. July. Wing, 186, 186, 189 mm.
 - k-l. (?), ♂. Pulau Karimon, Rhio Archipelago. July. Wing, 188, 189 mm.
 - m. ♀. Changi, Singapore Id., July. Wing, 195 mm.
 - n. ♂. Kuala Lumpur, Selangor. March. Wing, 187 mm.
 - o. ♂. Rawang, Selangor. August. Wing, 186 mm.
 - p. ♀. Tanjong Malim, Perak. April. Wing, 201 mm.
 - q. ♂. Langkawi. March. Wing, 196 mm.
- Ninox scutulata borneensis* (Bp.).
- r. ♀. Sungei Paku, Seribas, S.W. Sarawak, Borneo. October. Wing, 172.

28. OTUS BAKKAMOENA LETTIA (Hodgs.).

Gyldenstolpe, p. 120; *Hartert, Vog. Palaarkt. Faun.* II, p. 975 (1913).

a-b. 2 ♀. Pulau Dayang Bunting, Langkawi.
7-10 December, 1916 [Nos. 3602, 3618.]

"Iris brown, bill pale greenish horn, tarsi white, tinged with greyish pink, claws pale horn."

After comparison with a considerable number of specimens of this group from all parts of the Malay Peninsula, south to Singapore Id. and from Sumatra and Borneo I have come to the conclusion that these two birds must be provisionally referred to this race described by Hodgson from the Eastern Himalayas. The toes are slightly, though not very markedly, more feathered than in the southern birds but the size wing 171 and 166 so much exceeds that of any specimen of *O. b. lempiji* (Horsf.) that it is impossible to identify them with that form whose wing never exceeds 157 mm. The two specimens differ widely *inter se*, one having the forehead largely buff while the colour beneath is deeper with strongly marked dark shaft stripes to the feathers of the belly while the other is much paler with transverse vermiculations on the feathers of the belly. I have seen birds closely resembling them both from Bangkok and North Siam and comparison is required with the Hainan form, *O. b. umbratilis*, (Swinh.) and with that from Formosa and South China, *O. b. glubripes* (Swinh.).

The present specimens have of course nothing to do with *Otus sagittatus* (Cass.) of which we have a specimen from Negri Sembilan.

These owls were very common on Dayang Bunting and their hooting was heard throughout the night. They had probably come south on migration as *O. B. lempiji* also occurs in the same region.

29. OTUS BAKKAMOENA LEMPIJI (Horsf.).

Scops lempiji, *Sharpe, Cat. Birds Brit. Mus.* 11, p. 91 (1875); *Robinson and Kloss* p. 31; *Robinson, antea*, vol. V, p. 91 (1915).

a. ♀. Sungei Kilim, Langkawi, 25th March, 1909.

This bird is typical *O. b. lempiji* having a wing of 156 mm.; another female from Bandon has the wing 152 and a male from Perlis about 150 mm. These last two were obtained in June and November respectively and probably represent the resident race.

30. OTUS SCOPS MALAYANA (Hay).

Scops malayana, *Hay*; *Sharpe, tom. cit.* p. 58; *Robinson and Kloss*, p. 31; *id. antea*, vol. VI, p. 226 (1916).

We obtained a pair on Langkawi in February, 1909. Apparently not uncommon towards the north of the Peninsula but very rare in the south.

31. PELARGOPSIS AMAUROPTERA (Pears.).

Sharpe, tom. cit. p. 97; *Robinson and Kloss*, p. 33.

Ramphalcyon amauroptera, *Oberholser, Proc. U. S. Nat. Mus.* xxxv, p. 661 (1909).

a-c. 3♂. Sungei Udang, Terutau, 11-16th March, 1909.

d. ♂. Pulau Dayang Bunting, Langkawi, 7th December, 1916. [No. 3601.]

"Iris greyish hazel, bill, tarsi and eyelids vermilion, claws greyish horn."

This handsome Kingfisher was fairly common on Langkawi and very abundant at Telok Wau, Terutau, though it was not met with outside the narrow littoral belt of mangrove. It has not as yet been recorded from any locality east of the Malay Peninsula, and Langkawi is its southernmost limit. In my experience, even when alarmed it is a very much more silent bird than others of its congeners. Total length 365 mm.

32. ALCEDO ISPIDA BENGALENSIS, GÜ.

Robinson. Ibis, 1915, p. 730; *Gyldenstolpe*, p. 115.

Alcedo bengalensis, *Robinson and Kloss*, p. 32.

Alcedo ispida (part.) *Sharpe, tom. cit.* p. 141.

a. ♂. Pulau Paya, between Langkawi and Kuala Kedah, 25th April 1915.

b. ♀. Pulau Dayang Bunting, Langkawi. 8th December 1916. [No. 3604].

c. ♀. Telok Wau, Terutau. 28th December 1916. [No. 3, 779].

d. ♀. W. side, Pulau Telibun, Trang. 3rd January, 1917. [No. 3824].

"Iris dark, upper mandible dark horn, lower reddish or pale vermilion, feet richer vermilion or coral, iris dark or hazel."

Fairly common all along the coast.

33. ALCEDO MENINTING, Horsf.

Sharpe, tom. cit. p. 138; *Robinson and Kloss*, p. 32.

a. ♂. Sungei Udang, Terutau, 8th March 1909. [F.M.S. Mus. No. 449/09.]

This species does not appear to occur in any part of Siam proper or in French Indo-China. In the Peninsula it is very widely distributed but nowhere at all common.

34. CEYX TRIDACTYLA (Pall.)

Sharpe, tom. cit. p. 174; *Robinson and Kloss*, p. 33; *Gyldenstolpe*, p. 114.

- a. ♀. Sungei Kilim, Pulau Langkawi, 23rd March 1909. [F.M.S. Mus. No. 447/09.]
- b. ♀. Kuala Kubong Badak, Pulau Langkawi, 19th March 1909. [F.M.S. Mus. No. 448/09.]
- c. ♀. Telok Wau, Pulau Terntau. 21st December 1916. [No. 3710].

Not very scarce in heavy jungle throughout the peninsula.

A careful examination of the whole series of this genus from the Malay Peninsula in the Museums, together with four specimens from Borneo, does not bear out Mr. Hartert's contentions that three species, viz. *C. tridactyla* (Pall.), *C. rufidorsa* (Strickl.)=*C. euerythra* Sharpe and *C. dillwyni*, Sharpe occur in the Malay Peninsula.* The first two, of course do, though I am inclined to think that the existence of a dark blue post-auricular spot in the type of *C. rufidorsa* proves that it is really an immature *C. tridactyla* and that the proper name for the red-backed form is, after all, *C. euerythra* Sharpe (type from Klang, Selangor). Specimens from the Malay Peninsula which at first sight appear to agree with Mr. Hartert's diagnosis of *C. dillwyni* on closer examination resolve themselves into immature *C. tridactyla* or sub-adult *C. rufidorsa*. The specimens from Borneo in the Museum are all *C. rufidorsa* with no dark frontal spot, no post auricular blue patch, and the wing coverts mainly rufous.

Parrot,† in some very confused remarks on the subject, has founded another subspecies of *C. rufidorsa*, *C. r. robusta*, on a specimen from Sumatra without sex or exact locality, which he suggests may be a mountain form. It has a wing of 62, which seems its main claim to distinction. There is also an insufficiently described "species"‡ from East Sumatra.

35. CARCINEUTES PULCHELLUS (Horsf.).

Sharpe, tom. cit. p. 198; *Robinson and Kloss*, p. 34; *Robinson, antea*, vol. V, p. 92; *Robinson*, p. 732.

- a. ♂. Kuala Kubong Badak, Langkawi, 17th March, 1909. [F.M.S. Mus. No. 487/09.]
- b. ♀. Sungei Kilim, Langkawi, 22nd March, 1909. [F.M.S. Mus. No. 489/09.]

Very much rarer in the north of the Peninsula than in the states further south.

36. HALCYON COROMANDA COROMANDA (Lath.).

Halcyon coromandus (Lath.): *Sharpe, tom. cit.* p. 217; *Robinson and Kloss*, p. 34.

* Nov. Zool VIII, pp. 429-430 (1902)

† Abhandl. der K. Bayern Akad. der Wissensch II. Kl XXIV, Bd I, p. 208 (1907).

‡ *Ceryx snopopygius*, Oberholser, Smiths. Misc. Coll. vol 60, p. 7 (1912) (Aru Bay, East Sumatra).

Entomothera coromanda coromanda, Oberholser, *Proc. U. S. Nat. Mus.* 48, p. 642 (1915).

Halcyon coromanda coromanda, *Gyldenstolpe*, p. 116.

a-b. ♂ ♀ ad. Kuah, Pulau Langkawi. 28th April, 1915.

c-d. ♂ ♀ ad. Sungei Udang, Pulau Terutau. February, March, 1909.

The two males have the wing, 105, 110 mm. and the females 108, 111 and are slightly darker than two females from Trang and Selangor which have the wings 116 and 113 mm. A slightly immature male shot in November on Pulau Jemor, Aroa Ids. in the middle of the Straits of Malacca has the wing 113 mm.

Oberholser (*loc. cit.* p. 642) considers the species as "strictly resident" but it is probable that like many other purely intertropical species it performs migrations of limited range. I am therefore inclined to doubt the validity of the race established for Sumatra (East and West), and Banka, *E. coromanda neophora*, Oberholser (*loc. cit.* p. 646). So far as I am able to judge from an adult male shot on 9th October, 1915, at Sungei Pelandok, Paku Seribas, S. W. Sarawak, the Bornean race, *H. c. minor* (Temm. and Schleg.) is quite separable from the typical form by its rich, darker colouration, the upper surface more strongly washed with lilac, and slightly smaller size. I have not as yet been able to examine good specimens from Singapore Island, which is stated by Oberholser to be inhabited by this form.

The species occurs also on Tioman but specimens from that island are too immature to identify subspecifically with any certainty.

37. HALCYON PILEATA (Bodd.)

Sharpe, tom. cit. p. 229; *Robinson and Kloss*, p. 31; *Robinson, Ibis*, 1915, p. 732; *Gyldenstolpe*, p. 116.

a-c. ♂, 2 ♀ Pulau Langkawi, 27th November, 1907. [F.M.S. Mus. 2897-9/07.]

d. ♂. Pulau Langkawi, 10th February, 1909, [F.M.S. Mus. 485/09.]

e. ♂. Telok Apau, Pulau Langkawi, 15th December, 1912.

f. ♂. Pulau Dayang Bunting, Langkawi. 8th December 1916. [No. 3603.]

g. ♀. Telok Wau, Terutau. 29th December, 1916. [No. 3787.]

"Iris dark, bill vermilion, darker at base, tarsi and toes vermilion, the latter darker."

There is extremely little *local* variation in this species throughout its range and a series from Borneo differs in no way from a large number from the Malay Peninsula. *Individual* variation is considerable, the rufous buff of the belly and flanks varying greatly in intensity. It is only very old birds indeed that entirely lose the black, crescentic edgings to the feathers of the sides of the breast indicative of immaturity.

A common rice-field bird wherever it occurs, though also found on the higher reaches of the rivers in deep jungle. Occasionally also on small islands in the Straits of Malacca during the winter months, evidently on migration.

38. *HALCYON CHLORIS* (Bodd.).

Sharpe, tom. cit. p. 273, Pl. VII, fig. 3; *Robinson, Ibis* 1915, p. 731.

Halcyon armstrongi, Sharpe; *Robinson and Kloss*, p. 34; *Robinson, aucta*, vol. V, p. 145; vol. VII, p. 71.

Halcyon chloris armstrongi, *Gyldenstolpe*, p. 117.

a-b. ♂, ♀. Burau, N. W. Langkawi, 13-14th December, 1916. Nos. 3627, 3640.

c. ♂. Pasir Raja, Pulau Lontar, S. W. Siam. 12th January 1917. No. 3896.

"Iris black, upper mandible white, basal two-thirds, lower mandible pinkish white, feet grey."

There is little to add to what has already been written on the variability of the Indo-Malayan races of blue-and-white Kingfisher. The three specimens listed above differ considerably, one having the ear-coverts almost black, a greenish black band round the nape continuous with them, while in the other the ear-coverts are much more bluish green and the nuchal collar is very narrow and barely visible. The flanks are pure white with no trace of the buffy tint present in the bright blue birds characterised as *H. humii*, Sharpe. The mantle in all is greenish blue but the wings and wing coverts are pure blue. Wing 106, 102, 101 mm.

39. *PYROTROGON ORESKIOS UNIFORMIS*, *subsp. nov.*

Harpactes oreskios (Temm.); *Ogilvie Grant, Cat. Birds Brit. Mus.* XVII, p. 494 (1892).

Pyrotrogon orescius, *Robinson and Kloss*, p. 39; *Robinson, Ibis*, 1915, p. 736, *Gyldenstolpe*, p. 105.

a-b. 2♂. Burau, N.W. Langkawi. 13th December, 1916. Nos. 3628, 9.

c-i. 3♂, 1♀. Telok Wau, Terutau. 25-27th December, 1916. Nos. 3736, 3740, 3755.6.

"Iris grey, bill, feet and orbits small, culmen black."

Dimensions of four males; TL. 274-299; W, 124-128; T, 150-174; B, 23.5-24; TS, 13.5-14 mm.

Fairly common on both the above islands.

A comparison of the above series and seventeen other specimens from various parts of the Malay Peninsula with nine specimens from Eastern Java (Idjen massif, nr. Banjoewangi) show that it is readily possible to distinguish the Malayan and Siamese from the typical Javan form, in that, both in males and females the rump and upper tail covert are concolorous with the back and not strongly tinged with zanthine orange. Dimensions are practically identical.

Types: Adult male. Lamra, Trang, Siamese Malaya, collected on January 10th, 1910.

Adult female: Gunong Jerai (Kedah Peak), Kedah, 2,800 ft. to 3,500 ft. collected on December 2nd, 1915.

Remarks: It is possible that *Oreskios gouldi* quoted by Ogilvie Grant, (*loc. cit.*) as of *Bp. Consp. Vol. Zyg.* p. 14 (1854) applies to this bird, but I have no access to the reference. The name, however, is of earlier date as it is quoted by Bonaparte in 1850 (*Consp. Av. I.* p. 151) as a synonym of *Trogon oreskios* and attributed to Swainson, though I cannot trace the quotation. I prefer, therefore, to regard it as a *nomen nudum*.

40. DICHOCEROS BICORNIS (Linn.)

Ogilvie Grant, Cat. Birds. Brit. Mus. XVII, p. 355 (1892); *Robinson and Kloss*, p. 35; *Robinson. Ibis*, 1915, p. 733; *Gyldenstolpe*, p. 113.

a. ♂. W. side Pulau Telibun, Trang, S.W. Siam, 2nd January, 1917. [No. 3911.]

Common on Terutau, Langkawi, Telibun and Lontar, but nearly always flying very high or feeding on very lofty trees and therefore difficult to procure.

41. RHYTIDOCEROS UNDULATUS (Shaw).

Ogilvie Grant, tom. cit. p. 382; *Robinson and Kloss*, p. 36; *Robinson, Ibis*, 1915, p. 733; *Gyldenstolpe*, p. 113.

a. ♂. Pasir Raja, Pulau Lontar, S.W. Siam, 12th January, 1917. [No. 3912.]

Also common on the islands.

42. ANTHRACOCEROS ALBIROSTRIS (Shaw and Nodder.)

Anthracoceros malabaricus, *Grant, tom. cit.* p. 365; *Robinson and Kloss*, p. 35.

Anthracoceros albirostris, *Robinson, Ibis*, 1915, p. 734; *Gyldenstolpe*, p. 112.

a. ♀. Burau, N.W. Langkawi. 13th December, 1916. No. 3631.

"Iris hazel, bill and casque ivory, black at tip and base, feet pale plumbeous with a greenish cast."

Common on Langkawi, Terutau and Pulau Butang in the Butang Archipelago, west of Langkawi.

The island specimens seem smaller than a male from Trang which approaches the larger Himalayan form *A. affinis* (Blyth), wing about 305 against a maximum of about 260 in the island birds.

43. EURYSTOMUS ORIENTALIS ORIENTALIS, Sharpe.

Eurystomus orientalis, Sharpe, *Cat. Birds Brit. Mus.* XVII, p. 33, pl. 11, fig. 1 (1892); *Robinson and Kloss, Ibis*, 1911, p. 32; *Stresemann, Nov. Zool.* XX, pp. 298-301 (1913); *Robinson, antea*, vol. V, p. 144 (1915).

a. ♀. Koh Muk (Pulau Muntia), Trang, S.W. Siam. 6th January, 1917. No. 3859.

b. ♂. Pasir Raja, P. Lontar, S.W. Siam. 10th January, 1917. No. 3871.

"Iris hazel, bill coral, black tip, feet coral."

Fairly common in all localities; also obtained at Pulau Terutau and P. Langkawi in former years from November to April.

I have again carefully gone through the considerable series of Rollers in the F.M.S. Museum and find that they have been collected in every month of the year, except June to September. There are, however, specimens dated July from Malacca in the British Museum, collected by Davison.

The series readily split on the general characters given for *E. orientalis* and *calonyx*, viz., the greater amount of blue on the outer tail feathers and inner secondaries in the latter form, but there is also another character and that even more marked, viz., the greater amount of blue on the primary coverts in *calonyx*, these feathers being never more than lightly edged with deep blue in *orientalis*.

There is no doubt that both races are migratory in the Malay Peninsula and that *E. orientalis orientalis* breeds in the country also, which *E. o. calonyx* almost certainly does not.

43. MEROPS VIRIDIS, Linn.

Merops sumatranus, Raffles, *Sharpe, tom. cit.* p. 61; *Robinson and Kloss*, p. 37; *Robinson, antea*, vol. V, pp. 92, 146.

Merops viridis, *Hartert, Nov. Zool.* xvii, p. 482 (1910).

a. ♀. imm. Pulau Langkawi, 8th February, 1909. F.M.S. Mus. No. 281/09.

In view of the fact that this species does not occur in Tenasserim or so far as is known further north in the Peninsula than Bandon, while there are no recent records from Siam proper, occurrences in Southern China and Lower Cochin China are open to doubt. The records of Oustalet and others are more likely to be referable to migratory specimens of the Philippine *M. bicolor*, Bodd.

It is unfortunate that we should have to transfer the name "*viridis*" from one well known species of Africa and India to this species but Hartert's statements cannot apparently be gainsaid. It is to be hoped, however, that some enthusiastic splitter will be found to discern differences between typical Javan birds and others from the Malay Peninsula, Borneo and Sumatra, as even the most austere lumpers would view the race with an indulgent eye and we should be able to return to the more familiar name *sumatranus* for the local form, with a clear conscience, even if it was only used as a subspecific title.

44. *MEROPS PHILIPPINUS*, Linn.

Sharpe, tom. cit. p. 71; *Robinson and Kloss*, p. 37; *Robinson, antea*, vol. v, pp. 146.

Merops superciliosus philippinus, *Gyldenstolpe*, p. 110.

a-b. 2♀. imm. Telok Wau, Terutau. 18-20th December, 1916. Nos. 3656, 3674.

"Iris carmine, bill black, feet greyish black."

Other specimens in the museum from Pulau Terutau are dated February and March. In the south of the Peninsula, probably from about the latitude of Terutau, this Bee-eater is almost certainly only a winter visitor, or at any rate is very rare at other seasons, all the specimens in the museums being dated from October to March. Further north it begins to be a resident form, as it was common on Koh Samui and Koh Pennan, islands in the Bandon Bight, about Lat 9°N., in May, 1913.

45. *MELITTOPHAGUS LESCHENAULTI SWINHOEI*, Hume.

Melittophagus swinhoii, *Sharpe, tom. cit.* p. 55; *Robinson and Kloss*, p. 36; *Robinson, antea*, vol. v, p. 92; *Robinson, Ibis*, 1915, p. 734.

Melittophagus leschenaulti swinhoei, *Gyldenstolpe*, p. 110.

a. ♂. Telok Wau, Terutau, 25th December, 1916. [No. 3739.]

"Iris carmine, bill and feet black."

Common also at Langkawi, whence specimens have been obtained in the months of February, April, November and December.

Immature birds have the chestnut bay of the forehead mingled with greenish, the throat paler and the chestnut colour of the lower throat preceding the black patch not nearly so marked.

This species has never been found further south in the Peninsula than Parit, central Perak, whence we have two specimens shot in September, 1911. It occurs neither in Borneo or Sumatra but reappears in a slightly altered form in Java and Bali as the typical *M. leschenaulti* (Vieill.)

46. *CAPRIMULGUS MACRURUS BIMACULATUS* (Peale).

Caprimulgus bimaculatus, Peale. *U. S. Expl. Exped.* viii, p. 170 (1848).

Caprimulgus ambiguus, Hartert, *Ibis*, 1896, p. 373; *Robinson and Kloss*, p. 37; *Robinson, Ibis*, 1915, p. 733.

Caprimulgus macrurus bimaculatus, Oberholser, *Proc. U. S. Nat. Mus.* 48, p. 595 (1915). *Gyldenstolpe*, p. 109.

a. ♂. ad. Pulau Langkawi, 1st December, 1907. F.M.S. Mus. 2896/07.

b. ♂. vix ad. Pulau Langkawi, 3rd March, 1909. F.M.S. Mus. No. 276/09.

In the paper quoted above Mr. Oberholser has revived a name of Peale's for this common Malayan goatsucker, which had escaped Mr. Hartert's attention and has shown that in all probability the specimen came from the vicinity of Malacca and not from Singapore as stated.

The fairly large material in this museum bears out his contentions, in that a specimen from Pulau Besar, Malacca, agrees with other specimens from further north in the Peninsula and differs from three from Singapore Id. including an actual topotype of *C. m. anamesus*, Oberholser (loc. cit. p. 593), from Tanjong Katong, in being decidedly larger. The latter race is probably valid but larger series from Singapore and Sumatra require comparison with series from Borneo. Should they prove identical, as may not improbably be the case, they will have to bear the name *C. m. salvadorii*, Sharpe (*Proc. Zool. Soc. London*, 1875, p. 99, pl. 22, fig. 1). The large pale form, *C. m. albonotatus*, does not come down south into the Malay Peninsula or even into Southern Siam.

47. *CAPRIMULGUS INDICUS JOTAKA*, TEMM. & SCHLEG.

Caprimulgus jotaka, Hartert, *Cat. Birds Brit. Mus.* xvi, p. 552 (1892); *Robinson and Kloss*, p. 37.

Caprimulgus indicus jotaka, Hartert, *Vog. Palaarkt.* Heft. VII, p. 855 (1912).

a-b. ♂. vix. ad. ♀ ad. Telok Wau, Terutau. December 21st 1916. [Nos. 3704, 5.]

These specimens are rather small (male, wing, 196, female, 193) but the former is hardly adult as shown by the buffy borders to the white spots on the primaries. According to the limits given by Hartert they would fall to *C. indicus indicus* (Lath.), the Indian western form. In view of the dimensions of four birds from the adjacent island of Langkawi shot in the months December to March (203-211 mm) I do not however think this is really the case.

The species occurs in the south of the Malay Peninsula (but apparently only at considerable altitudes) and on islands of the Straits of Malacca but only during the months October to March.

The whole series agree well in dimensions with the specimen from Choungthanoung (between Mergui and Pakchan) Tenasserim, (wing, 7.9 in = 204 mm.) to which Hume (*Stray Feathers*. iii, p. 318 note, 1875) gave the name *Caprimulgus innominata*. As he has pointed out specimens from the Malay Peninsula and Tenasserim are certainly intermediate in size between specimens of *C. indicus indicus* (Lath.) and *C. indicus jotaka* (Temm. & Schleg.) in their breeding areas, and it would be interesting to ascertain if these intermediate-sized birds have themselves a distinct breeding area, in which case *C. indicus innominata*, Hume would be a fairly well defined subspecies. In default of this information I prefer to leave the question open.

48. COLLOCALIA FRANCICA GERMAINI (Oust.).

Collocalia germani, Oustalet, *Bull. Soc. Philomath. Paris* pp. 1-3 (1876); *Hartert*, *Ibis*, 1896, p. 376.

Collocalia francica merguiensis, *Hartert*, *Cat. Birds Brit. Mus.* xvi, p. 453 (1892) *Robinson*, *antea*, 7, p. 146 (1914).

Collocalia francica germani, *Gyldenstolpe*, p. 106.

a-b. ♀. Pasir Raja, Pulau Lontar, S. W. Siam, 11th January, 1917. [Nos. 3880, 3885.]

"Iris dark hazel, bill black, feet purplish brown."

These two birds, wing 122 and 121, agree closely with the large series obtained by us on the islands of the Bandon Bight in 1913, and which were named *C. merguiensis*, Dr. Hartert's statement that this race was identical with *C. germani*, Oustalet, having escaped our notice. The race is fairly distinct, being marked by having the pale rump band with clearly defined shaft stripes but is close to *C. f. inexpectata*, Hume, which is found on the Tioman group of islands and on the coast of Johore, but was originally described from the Andamans. This race however has the rump band very inconspicuous, often indeed hardly discernible, and may be the form that Oberholser has referred to *Collocalia fuscifaga vestita* (Less.) (*Proc. U. S. Nat. Mus.* 42, p. 15 (1912)) allocating to it specimens from Sumatra. East Johore and Simalur.

Both this and *C. innominata*, which can scarcely be distinguished in life and on the wing, were very abundant in all the limestone islands along the coast, the caves in which they breed being annually leased out to Chinamen at considerable rentals.

49. COLLOCALIA INNOMINATA, Hume.

Hartert, *tom. cit.* p. 503.

a-b. ♂. ♀. Pulau Belitung, S. W. Terntau, 22nd December, 1916. [Nos. 3701, 2.]

Nesting in very great numbers on this limestone island, which is riddled with caves and is the "Spire Island" of the British Admiralty Charts.

This species [with the exception of *C. gigas*, Hartert and Butler,* which is only known from two specimens, the type from the Semangko Pass and another from Java (wing 157 mm.)], is the largest of the local species. The two specimens listed above have wings of 129 and 131 mm. It is common on the mountains from Larut in Perak to Selangor and has also been obtained on the coast of Selangor at Tanjong Karang.

50. *CYPSELUS SUBFURCATUS*. Blyth.

Micropus subfurcatus, *Hartert, Cat. Birds Brit. Mus.* xvi, p. 456 (1891).

Apus affinis subfurcatus, *Hartert, Vog. Pal. Faun.* ii, p. 843 (1912).

a-b. 2 Koh Muk (Pulau Muntia), Trang, S. W. Siam. 5th January, 1917. Nos. 3855. 6.

"Iris and bill black, feet dark purplish flesh, toes black."

This species was exceedingly common on the cliffs of Koh Muk, where it built its untidy nests made of feathers and grass stems in the cracks of overhanging rocks at varying heights above the sea while the *Collocalia* built far inside the caves in total darkness.

While dealing with this genus it may be mentioned that the male of *Cypselus pacificus* obtained on Kedah Peak in December, 1915 (*antea* vol. vi, p. 226) agrees in all its characters with the subspecies *C. pacificus cooki*, described by Major Harington† from Goteik, Northern Shan States, where it was found breeding.

Our bird has the wing 163 and outer tail feathers 83 against 170 and 75 in the type, the white rump band very narrow with black shaft stripes and the white of the throat much restricted with marked shaft stripes, the mantle deep glossy black. These characters however occur also, though to a lesser degree, in a bird from the Semangko Pass shot in February, 1908.

It appears to me not improbable that Harington has compared a very adult bird in fresh pelage (his specimen was breeding) with younger birds. The size is not materially more than that of Malayan specimens, which vary from 163-176, while Hartert (*loc. cit.*) gives 176-184.5 for the wing of the species as a whole.

Specimens from Koh Pennan, shot in May, are much browner and duller.

51. *CACOMANTIS SEPULCHRALIS SEPULCHRALIS* (S. Müll.).

Cacomantis sepulchralis (S. Müll.); *Finsch, Notes Leyden Museum XXII*, p. 82 (1900).

Cacomantis merulinus (part.) *Shelley, tom. cit.* p. 268.

* *Bull. Brit. Orn. Club.* XI, p. 65 (1901).

† *Bull. Brit. Orn. Club.* XXXI, p. 57 (1913).

Cacomantis sepulchralis sepulchralis, *Stresemann*.
Nor. Zool. XIX, pp. 332-334 (1912).

a. ♂ ad. Koh Muk (Pulau Muntia) Trang, S. W.
Siam. 4th January, 1917. No. 3838.

"Iris orange, orbits lemon, bill black at tip and on culmen, remainder yellowish brown, feet dull orange."

Total length 213; wing, 112; tail, 118; bill from gape, 24; tarsus, 16 mm. Stresemann (loc. cit.) in his careful review of this group does not recognize this species as occurring on the mainland of Asia. The present bird, however, agrees closely with a small series collected in Western Java, differing only in being of a somewhat clearer gray above, less glossed, with an oily green lustre, which is very apparent in some Javanese birds.

52. *SURNICULUS LUGUBRIS DICRUROIDES* (Hodgs).

Surniculus lugubris (part), *Shelley*, *tom. cit.* p. 227, *Robinson and Kloss*, p. 39; *Robinson*, *Journ. Fed. Malay States Mus.* ii, p. 176 (1909).

Surniculus lugubris dicruroides (Hodgs), *Gyldenstolpe*, p. 102.

♂ ad. Pulau Langkawi, December, 1907.
[F.M.S. Mus. 2928/07.]

a. ♀ ad. Pulau Langkawi, February, 1909.
[F.M.S. Mus. 460/09.]

b. ♀ ad. Burau, N. W. Langkawi, 14th December, 1916. [No. 3644.]

♂ ad. Pulau Terutau, 1st December, 1907.
[F.M.S. No. 2927/07.]

c-e. ♂ 2 ♀ ad. Telok Wan, Terutau, 20-26th December, 1916. [Nos. 3673, 3741-2.]

f-g. ♂ ♀ ad. Pulau Telibun, Trang, S. W. Siam, 2nd January, 1917. [Nos. 3818-20.]

h-i. 2 ♂ ad. Chong, Trang, S. W. Siam, 3-4th December, 1909. [F.M.S. Mus Nos. 63, 122/10.]

j. ♂ ad. Padang Sireh, Perlis, Senggora border, 21st November, 1911.

k-m. 2 ♂ ♀ ad. Pasir Raja, Pulau Lontar, S. W. Siam, 11-12th January, 1917. [Nos. 3887, 3899, 3900.]

"Iris hazel, bill black, feet purplish slate."

Dimensions:—

Males. TL.—, 246, 253, 247,—,—,—, 256; W. 133, 132, 142, 135, 142, 136, 134, 136, 135; T. 136, 129, 137, 138, 129, 129, 135, 133, 138; B. 27, 28, 25,—, 25, 26,—, 25, 29; TS.—, 18, 18, 18,—,—,—, 17.

Females. TL.—,248,—,245, 258, 247; W. 128, 143, 132, 140, 133, 135; T. 114, 129, 128, 129, 131, 132; B. 24, 26, 27, 25, 5, 27, 27; TS.—,17,—,17, 5, 17, 17.

Stresemann (Nov. Zool. XX, p. 340) has separated the form from the south of the Peninsula, (type from Bentong, Pahang) as *Surniculus lugubris brachyurus* as having a wing averaging about 124 mm. with a tail always shorter than the wing. He includes in this race the birds from Borneo and Sumatra, confining the typical *S. lugubris* of Horsf. to Java, Bali and Ceylon, which is rather an anomalous distribution.

Our series from the lowlands of the south of the Peninsula is unfortunately somewhat deficient in adult birds; a male from Penang has the wing 128, tail 127, a male from Ulu Selama, wing 119, tail 116; a male from Tanjong Malim, 126, tail 123, a male from Kuala Tembeling, Pahang, close to the type locality, wing 119, and tail 114, and two males from Temengoh, North Perak, wing 117, 120, tail 118. A female from Pulau Jemor in the Straits of Malacca, near the coast of Sumatra, has the wing 135 and the tail 130, while two males from West Sumatra have the wing 126, tail 123 and a female, tail 123, wing 123. These specimens certainly bear out Stresemann's diagnosis.

Specimens from the mountains of the Peninsula where the species breeds are however emphatically not this race as two males from the Semangko Pass on the borders of Selangor and Pahang measure wings, 146, 138; tail, 138, 135, and must be referred to the Himalaic form as also one from Taiping shot in January, wing 143, tail 138 mm.

So far as the evidence goes it appears that two races are quite distinct viz. *Surniculus lugubris*, Horsf. from Java and Bali, which has possibly become very slightly modified in Sumatra, Borneo, and the South of the Malay Peninsula at low levels (*S. l. brachyurus*) and *S. lugubris dicruroides* from the Himalayas, through the Indo-Chinese Countries to the north of the Malay Peninsula and southwards along the main range at high elevations. Judging from analogy the Ceylon and Malabarese specimens will probably also prove separable. These conclusions are substantially those come to by Stresemann from the study of the very large material in the British and Tring Museums.

53. *CENTROPUS SINENSIS INTERMEDIUS* (Hume).

Centroccocyx intermedius, Hume; *Stray Feath* i. p. 454 (1873).

Centropus sinensis (Steph.); *Shelley tom. cit.* p. 343; *Robinson and Kloss*, p. 41.

Centropus sinensis intermedius, *Stresemann*, *Nov. Zool. XX*, p. 322 (1913); *Robinson, ante*, vol. v, pp. 93, 146; *Gyldenstolpe*, p. 103.

Sept., 1917.

a. 1 ♂ Koh Muk (Pulau Muntia) Trang, S. W. Siam, 5th January, 1917. [No. 3847.]

b-c. ♂ ♀ Pasir Raja, Pulau Lontar, S. W. Siam, 12th January, 1917. [Nos. 3892, 3898.]

"Iris carmine, bill and feet black."

Male. TL.—, 481; W. 201, 203, T. 248, 240; B. 45, 48; TS. 51, 52.

Female. TL. 524; W. 205; T. 284; B. 45; TS. 50.

These specimens differ from the southern *C. s. bubutus*, Horsf. in the characters previously assigned viz. slightly shorter wing, markedly shorter but much broader tail, and the purer, less ochraceous chestnut tint of the wings and scapulars. The two races of course grade into each other but a bird from Lenggong in Upper Perak decidedly belongs to the southern form.

54. RHOPODYTES SUMATRANUS (Raffles).

Shelley, tom. cit. p. 391.

a-b. ♂ ♀ Lem Pia, N. Side Telibun Straits, Trang, S. W. Siam, January 2nd, 1917. [Nos. 3826, 7.]

"Iris pearl, orbits orange red, fading posteriorly into yellow bill sea green, feet, greenish slate."

Climbing about in the characteristic awkward manner in a very thorny tree in an open plain.

The species is here approaching the northern limit of its range. The Museum also possesses a male from Krong mon, interior of Trang, shot on 17th February, 1910 which has been omitted in the list given by Mr. Kloss and myself (Ibis, 1911, p.)

55. COCCYSTES COROMANDUS (Linn.).

Shelley, tom. cit. p. 214; Robinson and Kloss, p. 39; Gyldestolpe, p. 101.

a. ♀ ad. Burau, N. W. Langkawi. 12th December 1916. No. 3621.

b-d. ♂ ad. Telok Wau, Terutau. 18th-28th December 1916. Nos. 3660, 3760, 3781.

e. ♀ ad. Pulau Telibun, Trang, S. W. Siam. 1st January 1917. No. 3805.

"Iris hazel, bill black, feet slate."

Male. 383; W. 158; T. 230; B. 35; TS. 25.

Female. TL 374, 388; W. 158, 162; T. 227, 234; B. 33, 34. TS. 27, 24.

Our series in the Museum shows no confirmation of statements by Shelley and Legge that there is a sexual difference in size in this species but we are very deficient in females, nor apparently is there any difference in the colour of the sexes when specimens in a similar condition of plumage are

compared. Worn specimens show a much more oily green tint on the mantle and inner secondaries.

Common along the coasts of the NW. Malay Peninsula and on the islands of the Straits of Malacca during the winter months, but rare even on migration in the south of the peninsula. Apparently not resident.

56. *CUCULUS MICROPTERUS*, Gould.

Shelley, op. cit. p. 241; *Robinson and Kloss*, p. 40; *Gyldenstolpe, Journ. Nat. Hist. Soc. Siam*, i, p. 232 (1915).

a. ♂ ad. Burau, N. W. Langkawi. 15th December 1916. No. 3646.

"Is, Cere olive green, bill greenish horn, the culmen black, gape yellow, feet chrome yellow."

TL. 305; W, 195, T, 153, B, 30. 5. TS, 18.

In the Malay Peninsula this species has been found breeding in July but as a resident it is scarce. It is, however, common on migration during the winter months.

57. *HIEROCOCCYX SPARVERIODES* (Vig.).

Shelley tom. cit. p. 232; *Robinson and Kloss*, p. 40; *Gyldenstolpe*, p. 102.

a. ♀ imm. Pulau Dayang Bunting, Langkawi. 9th December 1916, No. 3616.

b. ♀ imm. Pasir Raja, Pulau Lontar, S. W. Siam, 10th January, 1917.

"Iris light hazel, orbital ring and feet chrome, upper mandible black, lower and gape olive green."

TL. 380, 403; W, 233, 232; T, 220, 229; B, 34, 34; TS, 25, 28.

A fine adult female from Ko Khau, Trang, has the wing (measured dry) 232 and an immature male from the same locality 237. *Shelley loc. cit.* gives the wing of an adult as 8½ in. (210) so that the specimen he measured, if correctly recorded, must have been exceptionally small. *Gyldenstolpe's* adult male from Koon Tan, North Siam, measured 237 mm.

The species is evidently fairly common in the northern third of the Peninsula though probably only in the winter months but is extremely rare south of the latitude of Penang. As is the case with so many migratory species birds that have not yet attained the fully adult plumage appears to be in the great majority.

58. *HIEROCOCCYX NISICOLOR* (Hodgs.).

Robinson and Kloss, p. 40; *Robinson, antea*, vol. v, p. 93. *Hierococcyx fugax* (part.) *Shelley, tom. cit.* p. 2361.

a-c. 1 ♀ vix ad. 2 ♂ imm. Telok Wau, Terutau, 18th-24th December 1916. [Nos. 3659, 3728, 3729].

d. 1 ♂ ad. Sungei Udang, Terutau, 8th March, 1909.

TL. 310, 290, 273; W, 176, 171, 172; T, 158, 160, 145; B, 34, 28, 5, 30; TS, 18, 19, 19.

"Iris orange, orbital ring and feet bright chrome, bill yellowish green, tip and culmen green."

Fairly abundant, especially in the winter months, throughout the Peninsula but much commoner in the northern half, where its numbers are evidently largely augmented by migrants. Some birds, however, probably reside throughout the year as the museum possesses adults and extremely young birds shot at Temengoh, Northern Perak, on July 15th.

The most southerly specimen I have been able to examine is an adult male from Gunong Tampin, Negri Sembilan, and this is undoubtedly the present form. Specimens from Southern Johore and from Singapore will however not improbably prove to be referable to the original *Hierococcyx fugax* (Horsf.) described from Java, of which the present form is only the continental race.

The species has not as yet been recorded from any part of Siam except the Peninsula.

59. EUDYNAMIS ORIENTALIS MALAYANA, Cab. and Heine.

Eudynamis orientalis, Robinson and Kloss, p. 41; Robinson *antea*, vol. v, p. 146.

Eudynamis honorata (part.) Shelley, *tom. cit.* p. 316; Robinson *Ibis*, 1915, p. 737.

Eudynamis malayana, Cab. and Heine. *Mus. Hein.* iv, p. 52 (1862).

Eudynamis orientalis malayana, Hartert, *Nov. Zool.* X, p. 236 (1903); *Gyldenstolpe*, p. 103.

a, b. 2 ♂ vix ad. Koh Kadan (Pulau Papan),
Trang, S. W. Siam. 7th-8th January, 1917.
[Nos. 3865-6].

"Iris red, bill greenish slate, legs slate."

TL.—, 415; W, 198, 201; T, 211, 214; B, 38, 40; TS, 34, 34.
Fairly common everywhere.

The races of the Koel have been much discussed from the time of Walden (*Ibis* 1869, p. 239 et seq.), but no great degree of unanimity seems to have been attained. In the Malay Peninsula and possibly in Siam the question is further complicated by the fact that individuals of two different races appear to winter in the country while in addition there are possibly birds who are resident throughout the year, though we have no direct evidence on this point as the species is extremely rare anywhere on the mainland except in the north of the Peninsula.

Most authorities are agreed that in the Indian and Indo-Malayan regions two races occur, viz., one with a wing less than 8 in. (200) mm. and a less robust bill, the male with a greenish gloss and the female with clear white streaks on the head and white bars on the tail.

This race is *Eudynamis orientalis honorata* (Linn.)

The second race is larger, wing up to 8.6 in. (215 mm.) or more, with a more robust bill, with a cast of violaceous in the plumage of the male and the pale parts of the female buffy or rufescent buff.

This race is *Eudynamis orientalis malayana*, Cab. and Heine.

Judged by these standards specimens from Trang (Mainland and Islands), December and January; Koh Pennan and Koh Samui, SW. Siam, May; Pulau Langkawi, February; Pulau Paya near Pulau Langkawi, December; Pulau Jemor, Aroa Ids. November; Pulau Jarak, Straits of Malacca, March; and Pulau Lalang and Pulau Rumpia, Sembilan Ids., November and January; belong to this form, *Eudynamis orientalis malayana*, Cab. and Heine while others from Pulau Langkawi, February; Pulau Paya near Pulau Langkawi, April; Pulau Bidan, near Penang, April; Pulau Jarak, Straits of Malacca, March; Pulau Rumpia, Sembilan Ids. January and March, and Great Redang Id. off the coast of Trengganu, August, belong to *Eudynamis orientalis honorata* (Linn.).

The evidence, such as it is, points to the possibility that there is no resident Koel in the Malay Peninsula, south of Trang, and that the birds that are so numerous on the small islands off the coast are seasonal visitors, the differences noted between them being due to the fact that they have come from widely separated localities, thus accounting for the fact that two apparently different races can be shot on the same small island on the same day. The races of *Eurystomus orientalis* and *Accipiter gularis* afford parallel instances.

60. *CHRYSOCOLAPTES GUTTACRISTATUS INDO-MALAYICUS*, Hesse.

Chrysocolaptes guttacristatus (Tick.) Hargitt, *tom. cit.* p. 448 (part.) Robinson and Kloss, p. 47; Robinson, *antea*, vol. V, p. 147.

Chrysocolaptes guttacristatus indo-malayicus, Hesse, *Ornith. Monatsb.* p. 182 (1911). *Gyldenstolpe*, *Kongl. Svenska. Vetensk. Akad. Handl. Band* 50 No. 8, p. 49 (1913). Robinson, *Ibis*, 1915, p. 739;

a. ♂ Pulau Langkawi. 11th February, 1909. [F.M.S. Mus. 310/09.]

b. ♀ Kubong Badak, Pulau Langkawi. 18th March, 1909. [F.M.S. No. 315/09.]

c. ♂ Sungei Udang, Pulau Terutau. 8th March 1909. [F.M.S. No. 313/09.]

- d-g. 3♂, 1♀ Telok Wau, Pulau Terutau. 18-24th December 1916. [Nos. 3658, 3678, 3723, 3730.]
- h-i. ♂ ♀ Chong, Trang, S. W. Siam 11-15th December 1909. [F.M.S. Mus. Nos. 395, 396/10.]
- j. ♂ vix ad. Koh Samui, Bandon Bight, S. E. Siam. 8th May 1916.

"Iris orange, bill dark greenish slate, feet olive green."

The detailed measurements of two males from Terutau, taken in the flesh are; TL. 287, 290; W, 164, 157; T. 97, 95; B, 50, 54; TS. 31, 28.

The wing and bill (from gape) of the Langkawi specimens taken on the skins are male, W, 156, B. 55; Female, W, 151, B. 49; of three other specimens from Terutau:—Males, W. 159, 154, B. 52, 51. Female, 153, B. 46. Of the Trang specimens, Male, W. 157, B. 49; Female, W. 150, B. 51. Of the bird from Koh Samui, W. 160, B. 52. The dimensions of two males from Tonka (the type locality of the subspecies as given by Hume (*Stray Feath.* viii, p. 154) as 6.15 and 6.3 in. on the wing. viz. 156 and 160, which agrees well with the above series.

In my paper on the collection made by Mr. Kloss in S. E. Siam I unfortunately attributed Tickell's type of *Picus guttaeristatus* (Journ. Asiat. Soc. Bengal) iii, p. 578 (1833) to Northern Tenasserim, where the greater part of his collections were made, whereas it was really secured in the jungles of Eastern Bengal. As Hume, Oates and Blanford have pointed out the Southern Indian bird, *C. delessertii*, Blyth, that from eastern Bengal and the low country adjacent, *C. guttaeristatus* (Tick.) and the birds from the northern Malay Peninsula approximate in size, though it would appear that the Malay birds on the whole averages smaller, the wing never exceeding 164 mm (6.45 in.) while it is possibly brighter in general tone. *Chrysocolaptes sultaneus* (Hodgs.) from the Himalayas is a very large bird indeed and can fairly claim subspecific rank on these grounds alone though there are no tangible differences in colouration.

In the Malay Peninsula the bird is common in the northern third but is unknown from any locality between Penang and Southern Johore where a small form occurs, W. male, 148, 143; B. 46, 47, which will receive a name in due course. This form also occurs abundantly on the islands of the Rhio-Johore archipelago south of Singapore.

It thus appears that in order of size we have the following forms.

C. guttaeristatus sultaneus, Himalayas. Wing averaging 177 mm.

C. guttaeristatus guttaeristatus. Eastern Bengal, Burma, etc. Wing 161 or perhaps slightly more.

C. guttacristatus indomalayicus. Southern Siam and North Malay Peninsula, Wing 156 mm. (mean of twelve.)

C. guttacristatus delessertii, Southern India. Wing averaging 152.

C. guttacristatus (unnamed). Extreme south Malay Peninsula, Wing, 145 mm.

The bills grade in even greater ratio.

The maximum range of wing of the species as a whole is from about 190 to 143 or a subspecies to every nine mm. as all authorities seem agreed that no constant differences in colouration can be detected except possibly as noted above, a slightly more intense tint in the Indo-Chinese and Indo-Malayan specimens.

61. *ALOPHONERPES PULVERULENTUS* (subsp.)?

Hemilophus pulverulentus (Temm.); *Hargitt, tom. cit.* p. 494.

Alophonerpes pulverulentus, *Robinson and Kloss*, p. 47; *Robinson, antea*, vol. V, p. 95.

Mülleripicus pulverulentus harterti, *Hesse Ornith. Monatsb.* xix, p. 182 (1912), *Gyldenstolpe*, p. 96.

a-b. ♂ ♀ Pasir Raja, Pulau Lontar, S. W. Siam. 10th January, 1917. [Nos. 3872, 3.]

c. ♂ Telok Wau, Terutau, 27th December, 1916. [No. 3761.]

d. ♀ Pulau Terutau, 3rd December 1907. [F.M.S. Mus. 2907/97.]

e. ♀ Pulau Langkawi, 9th February 1909. [F.M.S. Mus. 309/09.]

f-g. ♂ ♂ Ulu Malacca, Pulau Langkawi 29th December 1912.

I have no access to Hesse's description of this form described from Burmah but which is apparently merely a larger form of the Malayan race, nor have I specimens from Java whence came Temminck's type so these specimens cannot at present be identified subspecifically with any certainty.

The wings of the males are 222, 228, 228 and of the four females, 221, 227, 227, 235, while Gyldenstolpe's two males from North Siam which would certainly belong to Hesse's race are given as 242, 235. A female from Kuala Lipis, Pahang is 229 mm.

Compared with a female from Anyut Paku, Seribas, S. W. Sarawak, whose wing measures 230 mm. all the Malayan birds are much greyer and less slaty black, especially on the top of the head, the mantle and undersurface, but this difference may be merely individual.

"Iris dark hazel, orbits slate, tall greenish horn, culmen at base darker feet slate."

62. *GEVINUS VIRIDANUS*, Blyth.

Hargitt, tom. cit. p. 47; *Robinson and Kloss*, p. 45; *Robinson, antea*, vol. V, p. 95.

Gecinus weberi, *Muller, Orn. Ins. Salanga*, p. 69 (1882).

Picus viridianus (sic) *Gyldenstolpe*, p. 89.

a-e. 1 ♂, 4 ♀. W. side Telibun, Trang, S.W. Siam. 2-3rd January, 1917. [Nos. 3800, 3813-4, 3821-2.]

e-n. 6 ♂, 3 ♀. Koh Muk (Pulau Muntia) Trang, S.W. Siam. 5-6th January, 1917. [Nos. 3839-40, 3848-51, 3863-5.]

n-g. 2 ♂, 1 ♀. Pasir Raja, Pulau Lontar, S.W. Siam. 10-11th January, 1917. [3876-7, 3888.]

"Iris chocolate, upper mandible black, lower yellow, slate at tip, feet olive, orbits slate."

Both bronzy green and olive green types are represented in the series from each island, all the specimens being quite adult.

Two males from Koh Muk present a curious abnormality, having the feathers of the flanks and abdomen largely creamy white, evidently due to partial albinism, which is by no means uncommon among species both of birds and mammals inhabiting small islands in the Malayan area, and presumably to be explained by deterioration of stock due to excessive inbreeding.

In the north of the Peninsula, this species takes the place of *G. vittatus*, which has not been met with north of Langkawi, while the southernmost specimen of *G. viridanus* in our possession was obtained at Pelarit, Perlis. The relation between the two forms is however evidently not subspecific as the large series in the Museums show no evidence of intergradation.

63. *GEVINUS VITTATUS EISENHOFENI* (Gyldenstolpe).

Gecinus vittatus (*nec Vieill.*). *Robinson and Kloss*, p. 45; *Robinson Ibis* 1915, p. 738.

Picus vittatus eisenhoferi, *Gyldenstolpe, Ornith. Monatsb.* xix, p. 28 (1916); *id. op. cit.* p. 88 (1916).

a. ♀. Pulau Dayang Bunting Langkawi, 10th December, 1916. [No. 3619.]

Gyldenstolpe (loc. cit.) is probably not incorrect in separating the northern race of this woodpecker from that inhabiting the Southern Malay Peninsula, Java and Sumatra, though the material at his disposal appears to have consisted of a single female with a wing of 142 and a tail of 128.

The present bird has the wing 137 and the tail, which is not completely grown, about 114. Two other females from the

same locality measure W. 137, 135; tail, 125, 115 and two males W. 138, 135, T. 122, 122.

Mr. Kloss' two specimens from S.E. Siam listed by me had the wing about 139. All these birds may be considered as belonging to the above cited northern race, which differs merely in size from birds from the south of the Malay Peninsula which for the present may be taken as representing true *C. vittatus* (typical locality Java) the colour distinctions noted by Gyldenstolpe in his single specimen occurring in both forms indifferently. The dimensions of the southern birds in the F.M.S. Museums from localities ranging from Kuala Selangor to the extreme south of the Peninsula are wing, 127-132 or a mean of 128.2 for eight specimens while the wing of the northern form as indicated by the specimens quoted above ranges from 135-142 with a mean also for eight specimens of 138.2 mm.

64. *CALORHAMPHUS HAYI* (J. E. Gray).

Shelley, tom. cit. p. 50; *Robinson and Kloss*, p. 43.

a-c. 2 ♂. 1 ♀. imm. Pasir Raja, Pulau Lontar, S.W. Siam. 9th January, 1917. [Nos. 3867-9.]

It is very unusual to find barbets frequenting even the larger islands near the coast of the Malay Peninsula and the occurrence of this species at Pulau Lontar was therefore a little surprising.

It seems hardly correct to rank this form from Sumatra and the Malay Peninsula as merely a subspecies of *C. fuliginosus* (Temm.) from Borneo, which differs so markedly in its deep brick red throat, chin and upper breast, as some authors have done. Malayan birds precisely agree with specimens from Korinchi, West Sumatra, and it is difficult to credit Buttikofer (*Notes Leyden Mus.* ix, p. 17 (1887) who seems to consider that the two species are but plumage stages of one and the same bird. Of the very large series of *C. hayi* from the Malay Peninsula and Sumatra that have passed through my hands I have never seen one that could for a moment be confounded with *C. fuliginosus*, while the same is true of the series of *C. fuliginosus* before me, when compared with *C. hayi*.

Immature birds have the throat and lower surface washed with pale sulphur yellow and the tips of the median wing coverts rufous buff. The bills are black in the males and brownish horn in the females.

65. *XANTHOLAEMA HAEMACEPHALA* (P. L. S. Mull.).

Xantholaema haematocephala, *Shelley, tom. cit.* p. 89; *Robinson and Kloss*, p. 44; *Robinson, antea*, p. 95 (1913).

a-c. 2 ♂ ♀. Pasir Raja, Pulau Lontar, S.W. Siam, 11-12th January, 1917. [No. 3890, 3906, 7].

"Iris hazel, bill black, feet and orbits coral."

These specimens have the wing, 84.5 mm. and I do not see how they are to be separated from typical specimens from the Philippines, with which they agree in size. In any event however there is a name available for the continental bird, viz. *Bucco indicus*, Lath. Ind. Orn. i., p. 205 (1790) which must be applied to Malayan birds, although Parrot has separated the Sumatran bird on the strength of a slightly smaller size which is not altogether borne out by our large series from West Sumatra and on certain differences in colour, some of which we can confirm, the most noticeable being the absence of the conspicuous orange yellow collar beneath the scarlet pectoral patch, which is very noticeable in all the Malayan but barely indicated in any Sumatran specimens, which in addition have the green centres to the feathers of the abdomen and flanks more restricted and the margins of a creamy rather than a sulphury yellow. Parrot's name for this form *Megalaema haemacephala delica*, (*Abhandl. der Konigl. Bayer. Akad. der. Wissensch.* (II) xxiv. Bd. 1, p. 169 (1907) is however antedated by *Bucco rafflesius* Boie, *Brief. Ost. Ind.* No. 15 (1832), of which our Korinchi and Padang coast birds may be regarded as topotypes.

65. *HIRUNDO BADIA*, Cass.

Sharpe, tom. cit. p. 166; *Robinson and Kloss*, p. 50; *Robinson, antea*, vol. V, p. 98.

a. Telok Wau, Terutau, 23rd December, 1916.
No. 3721.

"Iris and bill dark, feet dark maroon brown."

Very common indeed both on Langkawi and Terutau and probably all over the Peninsula where there are precipitous limestone hills. Resident throughout the year and not known outside the limits of the Peninsula. A closely allied, but paler and considerably smaller form, *H. hyperythra*, Layard, is resident in Ceylon.

66. *HIRUNDO JAVANICA*, Sparrm.

Sharpe, Cat. Birds Brit. Mus. p. 142 (1885); *Robinson and Kloss*, p. 50.

a. Koh Muk (Pulau Muntia) Trang, S.W. Siam,
5th January, 1917. No. 3854.

"Iris dark, bill and feet black."

Found breeding on the cliffs of Koh Muk together with *Cypselus subfuscatus* and *Collocalia* sp. Also common on Pulau Terutau, P. Langkawi and P. Tengah between Langkawi and P. Langkawi.

Common and resident all along the coasts of the Malay Peninsula, according to Hume and Davison rare in Tenasserim but very common in Southern Malaya. Curiously enough not hitherto recorded from Siam proper, though it is mentioned in a List of the Birds of Lower Cochin China by Tirant. Occurs also in the Philippines.

67. *PITTA MEGARHYNCHA*, Schleg.

Sclater, tom. cit. p. 421; *Robinson and Kloss*, p. 48; *Moulton, Journ. Straits Branch. Roy. Asiat Soc.* No. 67, p. 157, No. 311 (1914).

Pitta brachyura megarhyncha, Parrot, *Abh. Konigl. Bayern. Akad. der Wiss.* II. Kl. XXIV, Band. I, p. 225 (1907).

a. ♂. Kuah, Pulau Langkawi, 27th April, 1915.

b. ♂. Pulau Terutau, 3rd March, 1909.

Though Sclater in the Catalogue and Sharpe in the Hand-list (III, p. 180, 1901) record this species as coming only from Burma, Tenasserim and the Malay Peninsula, the types came from Banka, while Parrot records it, though with some doubt as to identification, from Sumatra, where, however, one would expect to find it in the low lying south eastern districts. Moulton on the strength of a specimen obtained in exchange from the Raffles Museum, Singapore, records it from Borneo, but the authenticity of the label needs confirmation.

The species is, as has been pointed out by many authors, totally distinct from, and not a form of, *P. cyanoptera*, which is often found with it. Besides the striking difference in the size of the bill the present species lacks the black chin-spot and the mesial dark line on the crown which is much duller in colour than in *P. cyanoptera*. The colours beneath are less intense and the white speculum on the wing more extensive. Both Mr. Kloss and myself have found it only in the vicinity of, or actually in, mangrove forest, while its ally is much more widely spread.

68. *PITTA CYANOPTERA*, Temm.

Sclater, Cat. Birds Brit. Mus. xiv, p. 416 (1888); *Robinson and Kloss*, p. 48; *Robinson, Journ. Fed. Malay States Mus.* V, pp. 97, 147 (1914); *Gyldenstolpe* p. 84.

a. ♀. Pulau Dayang Bunting, Langkawi, 9th December, 1916. No. 3614.

b. ♂. Telok Wau, Terutau, 27th December, 1916. No. 3759.

"Iris hazel, bill black, feet pinkish flesh."

Common throughout the Peninsula and Siam at one time or other of the year. Often in very large numbers on very small islands during the winter months.

69. *PITTA CULCULLATA*, Hartl.

Sclater, tom. cit. p. 448; *Robinson and Kloss*, p. 49; *Robinson, antea*, vol. v, p. 97 (1914).

A single somewhat immature female was shot on Pulau Paya, between Pulau Langkawi and the Kedah river, on April 28th, 1915. It is not rare in the north of the Peninsula generally but does not seem to be recorded from Siam proper.

70. PERICROCOTUS CINEREUS, Lafr.

Sharpe, *tom. cit.* p. 83; Robinson and Kloss, p. 55; Gyldenstolpe, p. 74; Hartert Vog. *Palaarkt. Faun.* I. p. 466 (1907).

a-b. 2 ♀. Kuah, Pulau Langkawi, 29th November, 1st December, 1907.

Common all over the Peninsula during the winter months but commoner in the north.

71. HEMICHELIDON FERRUGINEA, Hodgs.

Sharpe, *Cat. Birds Brit. Mus.* iv, p. 132 (1879); Robinson, *Journ. Fed. Malay States Mus.* ii, p. 16 (1906).

Hemichelidon cinereiceps, Sharpe, *Mus.* 1887, p. 441.

Muscicapa ferruginea, Hartert Vog. *Palaarkt. Faun.* i, p. 479 (1909).

a. ♂. Pulau Adang, Butang Archipelago, 20th April, 1911.

b-d. 3 ♀. Pulau Paya, nr. Kuala Kedah, 24-26th April, 1916.

This specimen is common in the high mountains of the Malay Peninsula, all our specimens being dated October to March, but the above specimens, together with one from Pulau Jemor, Arca Islands, shot in November 1906 are the only ones recorded from low elevations. It is evident, therefore that the species is migrant and not a permanent resident, the above specimens being on passage.

72. ALSEONAX LATIROSTRIS (Raffles).

Sharpe, *tom. cit.* p. 453; Robinson and Kloss, p. 51; Robinson, *Ibis*, 1915, p. 742; Gyldenstolpe, p. 74.

a. ♀. Pulau Dayang Bunting, Langkawi, 9th December, 1916. [No. 3606.]

b. ♂. Telok Wau, Terutau, 19th December, 1916. [No. 3668.]

"Iris black, bill black, the base yellowish, tarsi brownish black."

Common throughout the Peninsula during the winter months.

I have grave doubts as to the validity of *Alseonax siamensis*, Gyldenst. *Ornith. Monatsb.* xix, p. 27 (1916); *loc. cit.* p. 74, founded on two specimens from Ban Hue Pong, Northern Siam. The descriptions read like that of a freshly moulted specimen of the above species but without actual examination of types or topotypical specimens it is impossible to be certain.

73. POLIOMYIAS MUGIMAKI (Temm.).

Poliomyias luteola, Sharpe, *tom. cit.* p. 201; Robinson and Kloss, p. 52.

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Muscicapa mugimaki, *Hartert, Vög. Pal. Faun.* i, p. 492 (1910).

a. ♂ imm. Burau, N. W. Langkawi, 14th December, 1916. [No. 3636.]

b. ♂ imm. Telok Wau, Terutau, 28th December, 1916. [No. 3785.]

"Iris dark, bill horn, pinkish at base, feet dark brown."

Common in the Peninsula during the months October to April, immature birds in the dull pelage being in the great majority. We have numerous specimens from Terutau and also an immature male shot on Pulau Butang, Butang group, on April 21st, 1911.

74. *MUSCITREA GRISOLA GRISOLA* (Blyth).

Pachycephala grisola, *Gadow, Cat. Birds Brit. Mus.* viii, p. 220 (1883).

Muscitrea grisola, *Robinson and Kloss*, p. 54; *Robinson, antea*, vol. V, p. 148; *Robinson, Ibis*, 1915, p. 743; *Gyldenstolpe*, p. 78.

Pachycephala grisola grisola, *Stresemann, Nov. Zool.* XX, p. 355 (1913).

a. ♀. Kuala Kubong Badak, Langkawi, 19th March, 1909.

b. ♀. Pulau Langkawi, 16th February, 1909.

c-d. 2♀. Pulau Butang, Butang Archipelago, 20th April, 1911.

e. ♀. Pulau Nipis, Butang Archipelago, 22nd April, 1911.

f. ♂. Pulau Tengah, Butang Archipelago, 23rd April 1911.

All these birds are fully adult, those from the Butang Ids. being in breeding condition. Immature birds shot on Koh Samui, Bandon Bight in May and Pulau Ketam, coast of Selangor, in July, have the outer webs of the inner secondaries rufous brown and the wing coverts tipped and edged with the same colour.

Very common on most small islands near the Malay Peninsula where there is mangrove forest and also along the coast of the mainland in similar situations, but so far as my experience goes never found in dry forest.

There has been much discussion as to the systematic position of this bird. It is certainly not a typical *Pachycephala* but would appear to be best placed in a genus of its own, near to *Niltava* and *Rhinomyias*. If only on zoogeographical grounds, it must be removed from *Pachycephala*.

75. HYPOTHYMIS AZUREA PROPHATA, Oberholser.

Hypothymis azurea, Sharpe, *tom. cit.* p. 274; *Robinson and Kloss*, p. 53; *Robinson, antea* vol. V, pp. 99, 148.

Hypothymis azurea prophata, Oberholser, *Proc. U. S. Nat. Mus.* 39, p. 507 (1911); *Gyldenstolpe*, p. 79.

a-b. ♂ ♀. Burau, NW. Langkawi, 14 December, 1916. [Nos. 3632, 3642.]

e-j. 4♂, 4♀. Telok Wau, Terutau, 18-28th December, 1916. [Nos. 3652-3, 3694, 3709, 3938, 3749, 3770, 3786.]

k-l. ♂ ♀. W. side Pulau Telibun, Trang, SW. Siam. 2-3rd January, 1917. [Nos. 3809, 3820.]

"Iris dark hazel, bill and orbits smalt, feet blue grey."

Males range from 72 to 76 mm. in wing measurement, and are very constant in colouration over the whole length of the Malay Peninsula when specimens of a similar age and plumage are compared.

CYORNIS SUMATRENSIS (Sharpe).

Siphia sumatrensis, Sharpe *Tom. cit.* p. 451.

Cyornis sumatrensis, Hartert, *Nov. Zool.* ix, p. 550 (1902); *Robinson and Kloss*, p. 51; *Robinson, antea*, vol. v, p. 147 (1915); *Gyldenstolpe*, p. 76.

a-e. 4♂, ♀. Pulau Dayang Bunting, Langkawi, 8-9th December, 1916. Nos. 3607, 3609, 3611-13.

f. ♂. Burau, NW. Langkawi, 13th December, 1916. No. 3633.

g-j. 2♂, 2♀. Telok Wau, Terutau, 18-28th December, 1916. Nos. 3654, 3699, 3783-4.

"Iris and bill black, feet livid purplish flesh."

These specimens, with large series obtained from various other localities in the peninsula are very consistent *inter se*, and I have nothing to add to the brief description already given by myself and Mr. Kloss (*loc. cit.*). The wing varies from 70-73 mm. In all, the belly, under tail coverts and under wing coverts are pure unsullied white, therein differing from *C. dialilaema*, Salvad., which has these parts sullied buff, a larger patch of blue on the sides of the breast, a deeper blue last and is also possibly slightly smaller. The females also are quite different.

76. TERPSIPHONE PARADISI AFFINIS (Blyth).

Terpsiphone affinis, Sharpe, *tom. cit.* p. 274; *Robinson and Kloss*, p. 53; *Robinson, antea*, vol. v, pp. 99, 148; *Robinson, Ibis*, 1915, p. 745; *Gyldenstolpe*, p. 81.

a. ♀. imm. W. side Pulau Telibun, Trang, SW. Siam. 2nd January, 1917. [No. 3817.]

b. ♀. imm. Pasir Raja, Pulau Lontar, SW. Siam. 10th January, 1917. [No. 3881.]

"Iris dark hazel, bill, feet and orbits Payne's grey.

These specimens, are apparently birds of the year with the mantle and tail very pale cinnamon rufous but with a rather large bill, so that they are probably not the far Eastern form, *T. p. incii* (Gould) which winters in the Malay peninsula. Wing 83, 84 mm.

In the white plumage *T. p. incii* and *T. p. affinis* are with difficulty separated by the greater amount of black in the edgings of the tail feathers and wing coverts and by difference in size. Birds in the second year plumage are however easily distinguished by the rich maroon mantle and darker under-surface (especially throat) of *T. p. incii*.

77. CYANOPTILA CYANOMELANA (Temm.).

Xanthopygia cyanomelæna, Sharpe, *tom. cit.* p. 251.

Cyanoptila bella, Stejneger, *Proc. U.S. Nat. Mus.* xv, p. 328 (1892); *Robinson antea*, vol. II, p. 189 (1909).

Cyanoptila cyanomelæna, *Robinson and Kloss*, p. 53.

Muscicapa cyanomelana, *Hartert, Vog. Palaarkt. Faun.* 1, p. 492 (1909).

a. ♂. ad. Sungei Udang, Terutau. 19th March 1909. F.M.S. Mus. No. 372/09.

No further specimens of this beautiful Flycatcher have been obtained in the Malay Peninsula since the above bird was secured. We have it, however, both from Borneo (Ulu Paku, Seribas, November, and from Korinchi, Sumatra, March).

78. AEGITHINA VIRIDISSIMA (Bp.).

Sharpe, Cat. Birds Brit. Mus. vi, p. 55 (1881); *Robinson and Kloss*, p. 55.

a-c. 3♂. Telok Wau, Terutau. 18-26th December 1916. [Nos. 3657, 3752, 3681]

"Iris dark hazel, bill plumbeous, upper mandible black, feet slaty green."

By no means a common bird in the Malay Peninsula, where it keeps much more to deep jungle than its congener, *Ae. tiphia*. This species is here approaching its northern limit, not having been obtained beyond Trang.

79. CHLOROPSIS VIRIDIS ZOSTEROPS, Vig.

Chloropsis zosterops, *Sharpe, tom. cit.* p. 24; *Robinson and Kloss*, p. 55.

a. ♂. W. side Pulau Telibun, Trang, S.W. Siam. 2nd January 1917. [No. 3811.]

b, c. ♂, ♀ Pasir Raja, Pulau Lontar, S.W. Siam.
10th-12th January 1917. [Nos. 3879, 3932.]

"Iris hazel, bill black, in the female the lower mandible light horn, feet slate or Payne's grey."

In a review of this group (Nov. Zool. ix, pp. 211-212 (1902) Hartert has established a subspecies. *C. viridis viriditectus*, (type from Baram, Sarawak) for the Bornean form based on the fact that the shoulder spot is glistening green without any bluish gloss, and a considerable series from SW. Sarawak confirms his diagnosis. He considers that Malayan birds should also be placed in this race but in this I cannot agree as the majority of our large series precisely agree in the tint of the shoulder spot with a specimen from Rimbo Pengadang, Bencoolen (Jacobson coll.) which is a topotype of *C. zosterops*, Vig.

80. CHLOROPSIS ICTEROCEPHALA CHLOROCEPHALA, (Wald.).

Chloropsis chlorocephala, Sharpe, *tom. cit.* p. 28. Robinson and Kloss, p. 55; Robinson *antea*, vol. V, p. 101; Robinson *Ibis*, p. 745; *Gyldenstolpe*, p. 65.

a. ♂. Pasir Raja, Pulau Lontar, S.W. Siam. 12th January, 1917. [No. 3903.]

"Iris chestnut red, bill black, feet sage green."

Gyldenstolpe (*loc. cit.*) suggests that *C. icterocephala* may also occur on the southern parts of Siamese Malaya. As a matter of fact several specimens were obtained by Dr. Annandale and myself at Bukit Besar in Patani, though Grant in his report* on the collection has accidentally omitted the precise locality. This species meets and intergrades with *C. icterocephala* in Perlis whence we have a pair which it is impossible to refer definitely to either form.

81. IRENA PUELLA CYANEA, Begbie.

Irena cyanea, Sharpe, *tom. cit.* p. 179; Robinson and Kloss, p. 56.

a-c. 3 ♂ ad. Burau, NW. Langkawi, 12th-14th December 1916. [Nos. 3620, 3630, 3637.]

d-j. 1 ♂ ad. 4 ♂ imm., 2 ♀. Telok Wau, Terutau. 19th-28th December 1916. [Nos. 3662, 3664, 3671-2, 3689, 3713, 3774.]

"Iris carmine, bill and feet black."

Exceedingly common in heavy jungle on Langkawi and Terutau, while a single specimen was obtained in April, 1915, on the small island of Pulau Paya, near Kuala Kedah.

The series of males moulting into the adult plumage confirms *Gyldenstolpe's* observations on the closely allied race *I. p. puella* from further north (*loc. cit.* p. 66) that the adult livery is acquired by a direct change of colour in the feather without

* Fascic Malay, Zool III, p. 89 (1906).

moult, a possibility that has always been hotly disputed by many biologists.

The southern subspecies is extraordinarily close to the northern and only differs in the relative length of the under tail coverts, which more nearly approach the tip of the tail in the southern than they do in the northern form. There seems to be no tangible difference in size. Wings of Langkawi adult female, 122-128 mm.

82. *HEMIXUS MALACCENSIS* (Blyth).

Sharpe, tom. cit. p. 52; *Robinson and Kloss*, p. 56; *Robinson, antea* vol. V, p. 102 (1915).

a. ♀. W. side Pulau Telibun, Trang, S.W. Siam.
1st January 1917. [No. 3804.]

Quite rare in the north of the Peninsula, whence we have three specimens only, not differing from others from the vicinity of the type locality, Malacca.

83. *MICROTARSUS MELANOCEPHALUS* (Gm.).

Micropus melanocephalus, *Sharpe, tom. cit.* p. 65; *Robinson and Kloss*, p. 57. *Robinson, antea*, vol. v. p. 148.

Microtarsus melanocephalus, *Gyldenstolpe*, p. 66.

a-b. 2 ♂. Pasir Raja, Pulau Lontar, S.W. Siam.
12th January 1917. [Nos. 3904. 5.]

"Iris blue, bill and feet black."

84. *CRINIGER GUTTURALIS OCHRACEUS*, Moore.

Criniger sordidus, *Richmond, Proc. U. S. Nat. Mus.* xxii, p. 320 (1900); *Robinson and Kloss*, p. 57; *Robinson, antea*, vol. v, p. 102 (1915).

Criniger ochraceus, *Moore, Cat. Birds Mus. E.I.C.* i, p. 252 (1854); *Robinson, Ibis*, 1915, p. 746;

Criniger gutturalis sordidus, *Gyldenstolpe*, p. 67.

a. ♀. Burau, N.W. Langkawi, 15th December 1916. [No. 3645.]

"Iris chocolate, bill plumbeous, blackish on culmen, tarsi horny pink."

The Bulbuls of this group are extremely closely allied and the several species described are but little more than ill-defined subspecies. From descriptions, I fail to see in what respects *Criniger henrici*, *Cust. Bull. Mus. Hist. Nat. Paris*, 1896, p. 183, can be distinguished from this form. *Gyldenstolpe (loc. cit.)* lists both, from the same locality, Koon Tan, in Northern Siam.

The present race is common in the Northern Malay Peninsula, becoming slightly differentiated further south.

85. *PYCNONOTUS FINLAYSONI*, Strickl.

Sharpe, tom. cit. p. 144; *Robinson and Kloss*, p. 58; *Robinson, antea*, vol. V, p. 149; *Robinson, Ibis*, 1915, p. 747; *Gyldenstolpe*, p. 69.

Sept., 1917.

a-c. 4 ♂, 1 ♀. Telok Wau, Terutau. 20th-28th December 1916. [Nos. 3675, 3697, 3700, 3720, 3778.]

"Iris chestnut, bill black, feet slate."

Extremely common in the north of the Peninsula, largely replacing *P. analis*, which however also occurs; rare and sporadic in the south.

86. *PYCNONOTUS PLUMOSUS*, Blyth.

Sharpe, tom. cit. p. 152; *Robinson and Kloss*, p. 58.

a-c. West side, Pulau Telibun. 1-3rd. January 1917. [Nos. 3802, 3828, 9.]

"Iris chocolate, reddish or dark red, bill black, feet pinkish brown."

This is the only one of this group of the genus about which no difficulty arises in identification. Colouration is on the whole very constant, though freshly moulted specimens are darker above than others. Tail and wings always strongly washed with olive green and the ear-coverts with pale shaft stripes.

87. *PYCNONOTUS SIMPLEX* (Less.).

Sharpe, tom. cit. p. 153; *Robinson and Kloss*, p. 58; *Richmond*, *Proc. U. S. Nat. Mus.* 26, p. 506 (1903).

Pycnonotus sp. (?) *Richmond* loc. cit. p. 506.

Pycnonotus olivaceus chloeodis, *Oberholser*, *Smithsonian Misc. Coll.* vol. 60, p. 11 (1912).

a-c. 3 ♀. Telok Wau, Terutau. 20-29th December 1916. [Nos. 3677, 3732, 3794.]

"Iris Indian red, bill dark horn, feet pinkish yellow-horn."

I have compared these and numerous other Malayan birds with three specimens from the West Coast of Sumatra which can be regarded as typical of *P. simplex* (Less.) and also of *P. olivaceus chloeodis*, *Oberholser*, and can detect no material differences, certainly none that would warrant even subspecific distinction.

The wings of three Sumatran birds are 76, 77, 82, while nine Malayan birds average 81 mm. The Sumatran bird cannot therefore be said to be "larger."

The colour of the irides, relied on by *Richmond* for separation of species, is quite unreliable. Two Sumatran birds recorded by myself have them "white" and a third by *Jacobson* "light orange," while the Terutau birds had them as noted above "Indian Red," but they are undoubtedly all the same form.

In any event the Sumatran bird, if distinct, must be called *P. simplex simplex* (Less.) while the Malayan bird (type from Malacca compared) will be *P. simplex brunneus* (Blyth), *Journ. Asiat. Soc. Bengal* xiv, p. 568 (1842).

88. PELLORNEUM SUBOCHRACEUM, Swinh.

Sharpe, tom. cit. p. 521; *Robinson and Kloss*, p. 59; *Robinson antea*, vol. V, pp. 103, 149; *Robinson Ibis*, 1915, p. 748; *Gyldenstolpe*, p. 748.

a-b. ♂ ♀. Burau, N. W. Langkawi. 12th December 1916. Nos. 3623, 4.

c. ♂. Pasir Raja, Pulau Lontar, S.W. Siam. 11th January 1917. No. 3884.

"Iris chestnut, orbital space sage green, bill horn, lower mandible yellowish, feet pale yellowish flesh.

Exceedingly common over the whole of the northern third of the Malay Peninsula and in the Langkawi group, frequenting low trees in secondary jungle and shrubs and bushes at the edges of open spaces.

The large series in the F.M.S. Museums shows considerable variation in the depth of tint of the buff on the lower surface and in the width and intensity of the black shaft stripes on the breast as is noted by *Gyldenstolpe*. The differences are apparently due to age and are not correlated with locality.

89. MALACOCINCLA ABBOTTI (Blyth).

Turdinus abbotti, *Sharpe, tom. cit.* p. 541; *Ogilvie Grant Journ. Fed. Malay States Mus.* iii, p. 29 (1908); *Robinson Ibis*, 1915, p. 749; *Robinson and Kloss*, p. 59.

Turdinus olivaceus, *Robinson antea*, vol. V, pp. 103, 149 (1915).

Turdinus abbotti olivaceum, *Hartert, Nov. Zool.* ix, p. 562 (1902).

Turdinus abbotti abbotti (Blyth) *Gyldenstolpe*, p. 57.

a-b. ♂, ♀ Burau, N. W. Langkawi, 12th December, 1916. [Nos. 3625, 3626.]

c-m. 6 ♂, 6 ♀ Telok Wau, Terutau, 20-28th December, 1916. [Nos. 3667, 3682, 3687, 3690, 3692, 3698, 3706, 3733-4, 3750-1, 3771.]

n-o. ♂, ♀ Pasir Raja, Pulau Lontar, S.W. Siam, 12th January, 1917. [Nos. 3908-9.]

"Iris red, reddish chestnut or orange, bill slate, black on culmen, feet flesh or brownish flesh."

Diametrically opposite opinions have been expressed by *Grant* and *Hartert* (*loc. cit.*) on the separability of the northern and southern forms of this species, *Turdinus abbotti*, *Blyth. Journ. Asiat. Soc. Bengal.* xvi, p. 601 (1845), type from Ramree Id., Arakan, and *Malacopteryx olivaceum*, *Strickland, Ann. and Mag. Nat. Hist.* xix, p. 132 (1847), type from Malacca.

As I have suggested elsewhere (*Ibis*, 1915, p. 749) much of the discrepancy is probably due to the rapidity with which skins of this and other allied Timeline species fade.

It would seem to be a fact, however, that the majority of southern birds are dull, therein conforming with the diagnosis of *M. a. olivaceum* (Strickl.) while the majority of those from the north are bright, agreeing with *T. abbotti abbotti* (Blyth). This is not, however, universally true in the present series, as the pair from Langkawi, one from Terutau and one from P. Lontar, the most northerly locality visited, are as dull as any from Kuala Lumpur and other parts of Selangor. The remainder, and also specimens collected in 1915 in Langkawi are brighter birds, having the undertail coverts rich buffy rufous, the rufous buff of the flanks carried up high on the sides of the chest. Birds from Trang vary and ones from Perlis are brighter than Selangor and Pahang skins. We have a topotype of *M. a. olivaceum* from Malacca, but it is a native skin so old and deteriorated that no reliable comparison can be made with it. None of the specimens are quite so bright as those obtained by Mr. Kloss on the coasts and islands of SE. Siam and listed by me in the Ibis for 1915.

Gyldenstolpe (*loc. cit.*) is in error in stating that these specimens were referred to *T. a. olivaceum*, though a reference is given to Hartert's discussion of the question under that heading.

Pending the collection of a large series from topotypical localities I have not placed these birds under any subspecific name. I have little doubt however that if *M. a. olivaceum* is shown to have any real existence, which for the present must remain an open question, we shall have to call in the aid of a quadriminomial or even quinquenomial system, as is already used in some cases by Hartert, Stresemann and Parrott. If this comes into use at all extensively it becomes an open question whether a return to a bald binomial system is not, after all, the simplest and most convenient plan.

90. MIXORNIS RUBRICAPILLA RUBRICAPILLA, *or subsp nov.*

Mixornis gularis, Sharpe, *tom. cit.* p. 576; Robinson and Kloss, p. 62: Robinson *antea*, vol. v, p. 106 (1915); Gyldenstolpe, p. 60.

Mixornis gularis rubricapillus, Robinson *antea*, vol. v, p. 149 (1915).

Mixornis gularis rubricapilla, Robinson, *Ibis*, 1915, p. 751.

a. ♀. Burau, N.W. Langkawi, 14th December 1916. No. 3643.

b-g. 3 ♂ 3 ♀. Telok Wau, Terutau, 18th-26th December. Nos. 3655, 3676, 3703, 3726, 3747-8.

h-i. ♂, ♀ W. side Pulau Telibun, Trang, S.W. Siam. 1st-2nd January 1917. Nos. 3803, 3819.

"Iris whitish, whitish yellow or yellowish white; pale yellow or pale orange, bill bluish slate, black on culmen, feet sage green or yellowish green, orbits bluish slate."

Oberholser's unfortunate discovery that Raffles' *Motacilla gularis* hitherto used for this species in its broad sense is preoccupied and therefore untenable throws the whole of the nomenclature of this and allied forms into the greatest confusion.

In the first place it will be generally admitted that the present form and *Motacilla rubricapilla*, Tickell, Journ. Asiat. Soc. Bengal, p. 576 (1833) from eastern Bengal are only sub-specifically distinct. As a group name Tickell's will therefore take precedence of *Prinia pileata*, Blyth, Journ. Asiat. Soc. Bengal, xi. p. 204 (1842) from Malacca, which Oberholser substitutes for *gularis*.

In 1850 Bonaparte (Conspectus Av. i, p. 217), misled by Horstfield's bad figure of *Timalia gularis* Zool. Res. Java, (1824) and assuming that the bird came from Java, which was not the case, renamed the Sumatran bird as *M. sumatrana* with the brief but sufficient diagnosis "*Minor subtus cum gula flavissima*."

Himalayan birds are also described under the names *Iora chloris*, Blyth, Journ. Asiatic. Soc. Bengal, xi, p. 794 (1842) and *Mixornis ruficeps*, Hodgson, P.Z.S. 1845, p. 23, these names being pure synonyms of each other.

In 1900 Col Rippon described* (Bull. Brit. Orn. Club. xi, p. 11), under the name *Stachyridopsis sulphurea* from Namchet, S. Shan States, what is only a form of this species, and finally Gyldenstolpe describes yet another race from North Siam as *Mixornis gularis minor*.

These last two forms (I have examined Rippon's type) are probably pure synonyms of each other, the race being distinguished, apart from its somewhat small size, by the clear yellow underparts, the reduction of the shaft stripes on the throat to mere hair lines and by great diminution of the chestnut tinge on the cap, mantle and external aspect of the wings. The form, spread over the greater part of Tenasserim, the southern parts of Siam and the northern third of the Peninsula is fairly uniform in character and in the absence of direct comparison with topotypes of Tickell's *M. rubricapillus*, cannot be separated from that form. It has had, at present no subspecific name assigned to it. In the central section of the Malay Peninsula it grades into the next form, *M. r. pileata*, which is characterised by the somewhat richer coloured under-surface, less tinged with glaucous green and by its slightly smaller size. The shaft stripes on the throat are broader and the chestnut cap more sharply defined. This form extends from Central Perak down the Peninsula and is also found on the Rhio Archipelago. We possess topotypes from Malacca.

Finally the Sumatran bird is just separable by still richer colouring, shaft stripe very strongly marked and extending on to the flanks. Lores and superciliary feathers dark. This is *Mixornis rubricapilla sumatrana*, Bp.

* *Smithsonian Misc. coll.* Vol. 60, p. 9 (1912).

The races are therefore :—

Mixornis rubricapilla rubricapilla (Tick.). Eastern Bengal, Tenasserim. Southern Siam and Indo-china and North Malay Peninsula.

Mixornis rubricapilla chloris (Blyth), Sub-Himalaic tracts, Nepal to Horam, North Shan States.

Mixornis rubricapilla sulphurea (Rippon). Southern Shan States and N and N.E. Siam.

Mixornis rubricapilla pileata (Blyth). Southern half Malay Peninsula and Rhio Archipelago.

Mixornis rubricapilla sumatrana Bp. Sumatra.

*Mixornis rubricapilla zaptera** Oberholzer. Tana Masa, Batu Islands, W. Sumatra.

Mixornis rubricapilla zarhabdota,* Oberholzer. Pulau Bangkaru, Banyak Islands, W. Sumatra.

91. MYIOPHONEUS EUGENEI CRASSIROSTRIS, Robinson.

Myiophoneus crassirostris, Robinson, *Bull. Brit. Orn. Club*, xxv, p. 98; (1910); Robinson and Kloss, *Ibis*, 1911, p. 62.

a-e. 2♂ ad., 1♀ ad. 1♂ imm. 1♀ imm. Telok Wau, Terutau, 17-25th December, 1916. [Nos. 3650, 3679, 3696, 3724, 3735.

f. ♀. imm. Koh Muk (Pulau Muntia), Trang, S.W. Siam. 4th January, 1917. No. 3837.

g-h. 2♂ ad. Pasir Raja (Pulau Lontar), S.W. Siam. 10-11th January, 1917. Nos. 3874, 3886.

"Iris dark, bill yellow, black on culmen, feet black."

Fairly common in heavy jungle on the hills, generally in gullies and watercourses.

There is great variation in the very considerable number of adult specimens of this form now in the collection from the mainland of Trang and Perlis and from Langkawi and Terutau. All adults have the pale white spots on the wing coverts present though in a varying degree, these being hardly discernible in one bird from P. Lontar. They are also present in most immature birds which entirely lack the glistening tips to the feathers above and are dull black beneath.

There is considerable sexual variation in size, males being much the larger. It is evident that the form is intermediate between *M. temmincki*, which has a very wide range in continental India, ranging south to Aracan and Burmah and *M. eugenii*, which does not seem to be known West of the Salwin.

If the locality of the specimen of *M. crassirostris* mentioned by Gyldenstolpe, p. 62, viz., Java, is correct, I think that the identification will have to be revised as the specimens would almost certainly be referable to *M. flavirostris*, of which a closely related form, *M. dicrorhynchus*, Salvad. is met with in the south of the Malay Peninsula and in Sumatra.

92. *HERPORNIS ZANTHOLEUCA ZANTHOLEUCA* (Hodgs.).

Herpornis zantholeuca, *Sharpe, tom. cit.* p. 636; *Robinson and Kloss*, p. 63; *Robinson, antea*, vol. v, p. 107 (1915); *Gyldenstolpe*, p. 62.

a-b. 2♀. Burau, NW. Langkawi, 14th December, 1916. No. 3638.

"Iris reddish, bill pale horn, darker on culmen, yellowish at base, feet pale pinkish flesh."

Fairly common at this one locality on Langkawi in open ground near the sea. Widely distributed throughout the Peninsula and very constant in characters, rather more abundant in the north.

93. *GEOCICHLA CITRINA CITRINA* (Lath.).

Geocichla citrina, *Hume, Stray. Feath.* vi, p. 250 (1878) *Seebohm. Cat. Birds, Brit. Mus.* v, p. 176 (1881); *Robinson and Kloss*, p. 63; *Gyldenstolpe*, p. 46.

a. ♂. Pulau Dayang Bunting, Langkawi, 9th December 1916. [No. 3617.]

b. ♀. Pasir Raja, Pulau Lontar, S.W. Siam. 12th January 1917. [No. 3895.]

"Male. Iris dark, bill dark greenish black, feet pinkish flesh tinged with yellow. Female. Iris hazel, bill upper mandible dark horn, lower bluish horn, feet yellowish pink horn."

Besides the above series we have twelve specimens of both sexes shot in various localities in Trang and on Terutau and Langkawi from November to March and a fine adult male from Menuang Gasing, 3-4,000', Ulu Langat, Selangor, February 7th 1912.

There has been much discussion and difference of opinion on the point as to whether *Geocichla innotata*, Blyth, *Journ. Asiat. Soc. Bengal*, xv, p. 370 (1846), described vaguely as from "Malacca" has any claims to even subspecific rank.

The "species" is supposed to differ in richer colour above and in the total absence of white markings on the wing coverts. As regards the tint there is very large variation, both sexual and individual, in specimens with markings on the wings (*G. citrina*) and this character can therefore be disregarded. The white tips to the wing coverts are very variable and specimens lacking or nearly lacking them occur together with those in which they are highly developed. It may further be noted that with the exception of the above-mentioned specimen from the mountains of Selangor, which has strongly marked white patches on the wings, no exactly localised specimens of any *Geocichla* of this type has ever been obtained in the Malay Peninsula south of Penang.

Specimens vaguely labelled "Malacca" or of Malacca "make" may have come from almost anywhere especially since until recent years bird skins were a large export from the territory and the collection thereof a trade which afforded occupation to considerable numbers of hunters who travelled far in pursuit of it.

The specimens collected by Mr. Kloss on the coasts and islands of S.E. Siam, *Ibis* 1915, p. 752 were certainly all *G. innotata*, in that they lacked the wing spots, but his series was small. Possibly Blyth's original locality was incorrect and the real locality of his types was Siam or Indo-China. I am inclined to think that the species is, at anyrate partially, migratory, which would account for its sporadic appearance in the more southern parts of the Malay Peninsula and for its greater abundance in the north of the Peninsula during the winter months.

94. *TURDUS OBSCURUS* (Gm.).

Robinson and Kloss, p. 64; *Robinson, Ibis*, 1915, p. 753; *Gyldenstolpe*, p. 47. *Hartert, Vög. Pal. Faun.* i, p. 656 (1910).

a-d. 2 ♂, 2 ♀. Telok Wau, Terutau. 19th-28th December 1916. [Nos. 3663, 3746, 3758, 3775].

e. 1 ♂. Pasir Raja, Pulau Lontar, S.W. Siam. 12th January 1917. [No. 3897].

"Iris hazel, bill yellowish horn, tip and culmen dark ash, feet yellowish horn."

Common in Trang and on the islands during the winter months; in the south of the Peninsula found, as a rule, only on the tops of the mountains, presumably on passage.

95. *MONTICOLA SOLITARIUS PANDOO* (Sykes).

Petrocincla pandoo, *Sykes, P.Z.S.* 1832, p. 87.

Petrophila solitaria, *Robinson and Kloss*, p. 64.

Monticola cyanea, Linn; *Gyldenstolpe*, p. 47.

Monticola solitarius pandoo, *Hartert, Vög. Pal. Faun.* i, p. 675 (1910).

a. ♀. Pulau Pandan, nr. Langkawi, 15th March, 1909. [F.M.S Mus. 406/09.]

b. ♀. Gantang, Trang, S.W. Siam. 12th December, 1909.

C. ♂. Lem Pia, N. Telibun Straits, Trang, S.W. Siam. Jan. 3rd 1917. [No. 3825.]

d. ♂. W side Pulau Telibun, Trang, S.W. Siam. 1st January, 1917. [No. 3801.]

e-f. ♂. Batu Caves, nr. Kuala Lumpur, Selangor. 3rd August, 1908 and 24th January, 1912.

g. ♀. Batu Caves, nr. Kuala Lumpur, Selangor.
24th May, 1910.

"Iris hazel, bill and feet slaty black, gape yellow."

These specimens have the wing 113-124 mm. in the males, and 112-118 in the two measurable females and have no chestnut whatever in the plumage. The bird from P. Telibun is of a somewhat lighter blue and has traces of the black and white terminal tips to the feathers being the remains of the immature pelage. The series must apparently be referred to Sykes' subspecies originally described from the Western Ghats, India.

96. *MONTICOLA SOLITARIUS PHILIPPENSIS* (P.L.S. Mull.).

Hartert, *Vög. Pal. Faun.* i. p. 675 (1910); *Robinson, Ibis*, 1915, p. 752; *Gyldenstolpe* p. 48.

a. ♂. vix ad. West Side, Pulau Telibun, Trang,
S.W. Siam. Jan. 1st 1917. [No. 3807.]

This specimen has the remains of the immature pelage strongly in evidence; the undertail coverts are however mainly chestnut as are also a few of the under wing coverts and feathers of the belly. The wing is 118. The chestnut is very much less developed than in a specimen from Lem Ngop, S.E. Siam, collected by Mr. Kloss on January 15th 1915, but it is, I think best, placed with this form, though it must be admitted that the identification of two birds, shot within a few yards of each other on the same day (see above) as different subspecies is not very convincing, even on the assumption that the entirely blue bird is a winter visitor from the NW. while the chestnut form comes from the NE. The north of the Malay Peninsula is however indubitably the meeting place of easterly and westerly migration streams.

97. *LARVIVORA CYANEA* (Pall.).

Robinson and Kloss, p. 64, *Robinson, antea*, V, p. 149 (1914); *Gyldenstolpe*, p. 49.

a. ♀. Telok Wau, Terutau, 19th December, 1916.
[No. 3670.]

b. ♀. Pasir Raja, Pulau Lontar, SW. Siam, 11th
January, 1917. [No. 3889.]

"Iris hazel, upper mandible black, lower flesh at base, feet pale, whitish flesh."

As has already been noted by *Gyldenstolpe* and myself this species is not improbably resident throughout the year in the north of the Peninsula, specimens having been obtained as late as May 15th. In the south of the Peninsula it certainly only occurs during the winter months.

98. *KITTOCINCLA MACRURUS MACRURUS*, (Gm.)

Cittocincla macrura, *Robinson and Kloss*, p. 65; *Robinson, antea*, V, pp. 108, 150.

Sept., 1917.

Kittacincla macrurus macrurus, Hartert, Nov. Zool. ix, p. 572 (1902); *Robinson, Ibis* 1915, p. 753.

Kittacincla macrurus tricolor (part.) *Gyldenstolpe*, p. 50.

a-b. 2 ♂ ad. Pulau Dayang Bunting, Langkawi, 8-9th December 1916. [Nos. 3608, 3615.]

c-h. 5 ♂, 1 ♀. Telok Wau, Terutau, 19th-28th December 1916. [Nos. 3665-6, 3686, 3695, 3757, 3782.]

i-j. 2 ♀ ad. W. side Pulau Telibun, Trang, S.W. Siam. 2nd-3rd January 1917. [Nos. 3812, 3823.]

k. 1 ♂ ad. Koh Muk, Pulau Muntia, Trang, S.W. Siam. 5th January 1917. [No. 3853.]

"Iris hazel, bill black, feet fleshy white."

Hartert (*loc. cit.*) has dealt exhaustively with the races of the Shama but it is still somewhat uncertain in what districts the Indian race, *K. m. tricolor* (Vieill.) meets the Malayan and Indo-Chinese *K. m. macrurus* (Gm.).

The F.M.S. Museums possess large series of Shammas from the central and southern parts of the peninsula but the vast majority of the specimens are either fully adult males or immature birds and we are unaccountably deficient in adult females. The adult males vary greatly in the depth of chestnut tint on the undersurface and it is admittedly impossible to separate Indian and Indo-Malayan birds when this sex only is examined, but the female of *K. m. tricolor* is stated to be very much paler than that of *K. m. macrurus*. The three females in the list detailed above are decidedly paler than two adults from Selangor and it is possible that the birds from North Malay Peninsula and South Siam are intermediate. Among adults differences occur in the colour of the thighs, some having these parts white, with black bases to the feathers and others having them very strongly washed with chestnut but the differences are not apparently associated with locality.

Shamas (*murai batu* of the Malays) are very common on most islands off the coast, especially where these are high and rocky but are very much scarcer on the mainland or in flat country.

99. *ORTHOTOMUS ATRIGULARIS* (Temm.)

Sharpe, tom. cit. p. 220; *Robinson and Kloss*, p. 66; *Robinson ante*, vol. V, pp. 108, 150 (1915).

a. ♀ imm. Pulau Dayang Bunting, Langkawi. 30th November 1907.

b. ♂ ad. Pulau Langkawi, 18th February 1909.

c-d. ♂ ad, ♀ imm. Telok Wau, Terutau, 29th December 1916. [Nos. 3795, 6.]

Distributed throughout the Peninsula but especially common on the islands.

100. *PHYLLOSCOPUS SUPERCILIOSA SUPERCILIOSA* (Gm.).

Hartert, Vög. Palaarkt. Band. 1, p. 518 (1909); *Robinson, Ibis*, 1915, p. 755.

Phylloscopus superciliosus (Gm.) *Seebholm, Cat. Birds Brit. Mus.* v, p. 68 (1881); *Robinson and Kloss*, p. 66.

a-d. 2♂, 2♀. Telok Wau, Terutau. 19-29th December, 1916. [Nos. 3669, 3722, 3788-9.]

e. ♂. W. side Pulau Telibun, Trang, SW. Siam, 3rd January, 1917. [No. 3832.]

"Iris dark hazel, bill brownish horn, greater part of lower mandible and gape yellowish, feet dark greyish green or yellowish brown."

Fairly common in the islands. We found this species abundant on the mainland of Trang in December, 1910. A male from Taiping, Perak, shot on January 7th 1910, represents the southernmost locality from which the species has been obtained and is the only record for the British portion of the Peninsula.

101. *PHYLLOSCOPUS BOREALIS BOREALIS* (Blas).

Phylloscopus borealis, *Seebholm, Cat. Birds Brit. Mus.* V, p. 40 (1881); *Robinson and Kloss*, p. 65; *Robinson, antea*, vol. V, p. 150 (part.) (1915).

Phylloscopus borealis borealis, *Hartert, Vög. Palaarkt. Faun.* I, p. 517 (1909); *Robinson, Ibis*, 1915, p. 754; *id. antea*, vol. VI, p. 232 (1916).

a. ♂. Burau, N.W. Langkawi, 14th December, 1916. No. 3641.

b-c. 2♀. Telok Wau, Terutau, 17-26th December, 1916. Nos. 3649, 3745.

d. ♂. Pulau Butang, Butang Archipelago, 20th April, 1911.

"Iris dark, bill wax yellow, dark on culmen, tarsi greenish yellow, wax yellow darker in front, or yellowish brown."

These birds have the wing 62, 62, 66, 66 mm., with a small first primary just reaching or very slightly exceeding the primary coverts. They agree with a series obtained from near the summit of Kedah Peak in December, 1916.

102. *PHYLLOSCOPUS BOREALIS XANTHODRYAS* (Swinh.)

Phylloscopus zanthodryas, *Swinh. P.Z.S.* 1863, p. 296.

Phylloscopus borealis zanthodryas, *Hartert, loc. cit.* p. 518.

Phylloscopus borealis, *Robinson, antea*, vol. V, p. 150 (1915).

- a. ♂. Pulau Butang, Butang Archipelago, 21st April, 1911.
- b. ♂. S.W. Koh Pennan, Bandon Bight, S.W. Siam. 30th May, 1913.

These specimens agree with the descriptions of this subspecies in that they are considerably larger than the typical form (wing 72 mm.), are lighter and more yellowish beneath and possibly more greenish above, though specimens in differing states of plumage vary so much that it is difficult to determine this point.

The Koh Pennan specimen has a large first primary extending about 3 mm. beyond the primary coverts but that from P. Butang can be matched in this by others from Kedah Peak and the south of the Peninsula. Another bird from P. Butang shot on 20th April 1911, has the wing 60 mm. Specimens from S.W. Sarawak shot in November are rather bright but have the wing 66 mm. and are not this form, which, like so many migrant birds, appears only to reach N. Borneo.

103. *LANIUS TIGRINUS*, Drap.

Hartert, Vög. Palaarkt. Faun. I, p. 442 (1907); *Gyldenstolpe*, p. 39.

- a-b. ♂ imm., ♀ imm. Telok Wau, Terutau. 21st-26th December 1916. [Nos. 3691, 3753.]
- c-c. ♂ ad. Pulau Paya, near Kuala Kedah. 24th-25th April 1915.

"Iris dark, bill pale pinkish horn, dark at tip, feet pale slate."

Common throughout the Peninsula throughout the winter months though specimens in the adult plumage are always in the large minority.

104. *LANIUS CRISTATUS CRISTATUS*, Linn.

Lanius cristatus, *Gadow, Cat. Birds Brit. Mus.* viii, p. 271 (1883); *Robinson and Kloss*, p. 69.

Lanius cristatus cristatus, *Hartert, Vög. Palaarkt. Faun. I*, p. 446 (1907).

Otomela cristata, *Gyldenstolpe*, p. 41.

- a. ♀ ad. Kuah, Langkawi. 23rd April 1915.

A nearly adult female evidently on passage. This form is very common throughout the Malay Peninsula in September and October and in March and April. A few appear to stay throughout the winter. Much the commonest of the allied forms locally.

105. *LANIUS CRISTATUS SUPERCILIOSUS*, Lath.

Hartert, loc. cit. supra, p. 447.

- a. ♂ ad. Pulau Paya, near Kuala Kedah, 23rd April 1915.

A very fine adult bird.

106. *LANIUS CRISTATUS LUCIONENSIS*, Linn.

Lanius lucionensis, *Gadow, tom. cit. p. 274; Robinson and Kloss, p. 69.*

Lanius cristatus lucionensis, *Hartert, tom. cit. p. 447.*

a. ♀ ad. Langkawi. 30th March 1909.

107. *GRACULA JAVANA JAVANA* (Osbeck).

Mainatus javanensis, *Sharpe, Cat. Birds Brit. Mus. xiii, p. 102 (1890).*

• *Eulabes javanensis*, *Robinson and Kloss, p. 67.*

Gracula javana javana, *Stresemann, Nov. Zool. xix, p. 314 (1912).*

a. ♂. Pulau Dayang Bunting, Langkawi, 8th December 1916. No. 3610.

b. ♂. Koh Muk (Pulau Muntia) Trang, S.W. Siam. 5th January 1917. No. 3852.

c. ♂. Pasir Raja, Pulau Lontar, S.W. Siam. 10th January 1917. No. 3878.

"Iris hazel, lappets rich chrome, anterior greenish at base, bill orange, yellow at tip, tarsi rich chrome."

The specimen from Pulau Lontar shows an approach to *G. j. intermedia* in its smaller size, wing 167 against 182 in the Dayang Bunting bird, but the postocular space is entirely separated from the lappets by a patch of feathers, while the bill is not nearly so small as in true *intermedia*. It is possible that the Hainan and Eastern Siamese birds should after all be separated also, as *Gracula javana hainanus* (Swinh.), as Hartert seems inclined to do (*Nov. Zool. xvii, p. 251 (1910)*). In these the general size is strikingly smaller, especially in the bill, and the lappets are also apparently considerably diminished.

This Mynah was very common on all the islands, especially on Terutau.

108. *APLONIS PANAYENSIS STRIGATUS* (Horsf.).

Calornis chalybea (Horsf.); *Sharpe, tom. cit. p. 143; Robinson and Kloss, p. 68; Robinson, antea vol. v, p. 151.*

Aplonis panayensis strigatus >affinis, *Stresemann, Nov. Zool. xx, p. 376 (1913).*

a. ♀. Lem Pia, N. Side Telibun Straits, Trang, SW. Siam. 3rd January, 1917. No. 3834.

"Iris carmine, bill and feet black."

It is unfortunate that the name *strigatus* applied to the immature bird by Horsfield, but which is printed earlier in the same page should have to replace the more familiar *chalybea*.

Stresemann is probably correct in regarding all the forms of the genus occurring in the Oriental region as merely of subspecific value and basing them on the first described, viz.

Muscicapa panayensis, Scop. Del. Flor et Faun. Insubr. ii, p. 96, (1783) from the Philippines.

He is also correct in stating that there is a gradual transition from *A. p. strigatus* to *A. s. affinis* from Tipperah and Cachar, which is a larger bird with a more reddish violet sheen on the lower surface. It should be mentioned however that Hume (*Stray Feath.* vi, p. 394) absolutely denies that these differences exist.

The species is evidently extremely plastic and varies greatly in many of the small islands in the Malaysian area principally in size, in the development of the bill and in the degree and tinge of the metallic sheen on the plumage, some forms being almost dull black.

109. *ANTHUS RICHARDI MALAYENSIS* (Eyton.)

Anthus malayensis, Eyton P. Z. S. 1839, p. 104.

Anthus richardi malayensis, Stresemann, Nov. Zool. xix, p. 316 (1912).

Anthus malayensis, Robinson and Kloss. *Ibis*, 1911, p. 74; Robinson J., F.M.S. Mus. V, p. 151 (1914).

Anthus rufulus (part.) Sharpe, Cat. Birds Brit. Mus., x, p. 574.

Corydalla malayensis, Hume, S. I^r. viii, p. 65 (1879).

a. ♀. ad Pulau Langkawi. 17th February, 1909.

b. ♀. ad Pulau Langkawi. 27th September, 1915.

Wings 82, 77; Tarsi 29, 27.

This is a resident bird in the Malay Peninsula, whence no reliably identified examples of other races have been recorded. Stresemann's method of treating *rufulus* as a race of *richardi* and *malayensis* as its Malayan representative seems the most satisfactory way of regarding this bird.

110. *DICRURUS ANNECTANS* (Hodgs.)

Sharpe, tom. cit. p. 231; Robinson and Kloss, p. 72; Robinson, *Ibis*, 1915, p. 761.

a. ♀. imm. Telok Wau, Terutau. 20th December 1916. [No. 3680.]

b-c. 2 ♂ ad. W. side Pulau Telibun, Trang, S.W. Siam. 1-2nd January 1917. [Nos. 3806, 3810.]

"Iris carmine, bill and feet black."

This species is certainly merely a winter visitor to the Malay Peninsula and Straits of Malacca and no specimen has been obtained between the months of April and September. Immature birds indicated by the large amount of white in the plumage are always in the great majority. Little is known definitely of its distribution in the Indian Empire but it appears probable that it is a breeding bird in Upper Assam and the lower Himalayan foothills, west to Nepal.

III. DISSEMURUS PARADISEUS PARADISEUS (Linn.).

Dissemurus paradiseus, Sharpe, *tom. cit.* p. 225; *Robinson and Kloss*, p. 71; *Robinson antea*, vol. v., pp. 109, 150; *Hartert. Nov. Zool.* ix, pp. 579, 580.

Dissemurus paradiseus paradiseus, *Robinson, Ibis*, 1915, p. 760.

a-d. 2♂, 2♀. Telok Wau, Terutau. 19-24th December 1916. [Nos. 3661, 3688, 3712, 3727.]

e-f. ♂♀. Pasir Raja, Pulau Lontar, S.W. Siam. 9-12th January 1917. [Nos. 3870, 3894.]

"Iris carmine, bill and feet black."

Common on all the islands and on the adjacent coast.

Regarded as a species in the old-fashioned sense, this King Crow, ranging as it does over the whole oriental region, probably exhibits greater variation than almost any other species within the area.

While it is indubitably true that too many nominal species have been founded on material deficient both in numbers and in range, the converse is undoubtedly true and at the present time it is not possible to maintain that only one species can be maintained. Without going into the whole question, which the material at my disposal does not admit of, it may be stated that so far as material from Java, Borneo, Sumatra and nearly the whole length of the Peninsula shows, we can recognize the following forms.

1. A form with a fairly full, compressed and recurved crest with large rackets and a wing of more than 150 mm. = *Dissemurus paradiseus paradiseus* (Linn.).

Tenasserim, Northern two-thirds of the Malay Peninsula, Southern Siam, Sumatra and Java. *D. rangoonensis*, Gould, is probably synonymous.

2. A form with the crest less developed, slightly shorter wing and smaller rackets = *Dissemurus paradiseus platurus* (Vieill.)

Inhabits the extreme south of the Peninsula, the Rhio Archipelago, Java and Sumatra and is connected with the foregoing by intermediate specimens in the central third of the Peninsula.

3. A still smaller form, wing about 140 mm., tail rackets still more reduced and with practically no crest = *Dissemurus paradiseus brachyphorus*, Bp. Inhabits Borneo.

II2. ORIOLUS MELANOCEPHALUS, Linn.

Robinson and Kloss, p. 72; *Gyldenstolpe*, p. 23.

a. ♂ ad. Lem Pia, N. side Telibun Straits, Trang, S.W. Siam, 3rd January 1917. [No. 3833.]

"Iris red, bill pink, feet greenish grey."

Also occurs in Langkawi, this being its southernmost recorded locality.

113. *ORIOLOUS INDICUS*, Jerd.

Robinson and Kloss, p. 72; *Robinson, Ibis*, 1915, p. 758; *Gyldenstolpe* p. 22.

a.-b. ♀ ad., ♀ vix ad. Telok Wau, Terutau, 21-23rd December 1916. [Nos. 3693, 3711.]

c.-e. ♂ ad., 2 ♀ imm. Koh Muk (Pulau Muntia) Trang, S.W. Siam, 4-6th January, 1917. [Nos. 3845, 3860-1.]

f. ♂ ad. Pasir Raja, Pulau Lontar, S.W. Siam. 12th January, 1917. [No. 3891.]

"Iris red, bill pinkish horn, feet slate."

Very common in the winter months all over the north of the Peninsula; scarcer in the south. None of the specimens show any approach to the allied *O. tenuirostris*, which differs in the much narrower black nuchal band and the broader yellow tips to the tail feathers. It has been recorded from the extreme south of Tenasserim but never from within Peninsular limits.

114. *CORVUS MACRORHYNCHUS*, Wagl.

Robinson and Kloss, p. 71; *Robinson, antea*, vol. V, p. 150; *Robinson, Ibis* 1915, p. 761; *Gyldenstolpe*, p. 16.

a. ♂ Burau, NW. Langkawi, 14th December, 1916. [No. 3634.]

b. ♂ W. side Pulau Telibun, Trang, S.W. Siam, 3rd January 1917. [No. 3831.]

"Iris grey or hazel, bill and feet black."

Common at the fishing stations along the coast as elsewhere in the Malay Peninsula where this bird rarely occurs in the inland districts, where its place is taken by the totally different *C. compiler*, Richmond, *C. enca*, Horsf.

These specimens, which are in freshly moulted plumage, have the throat and back well developed and except on the head and neck are glossed with purplish and green, the former predominant. The bases of the feathers are dull grey but in two others from Langkawi and Terutau these are much paler, while a male from Trang has them nearly white. The whole series from the Malay Peninsula is somewhat variable in this respect as also in size, and in view of the fact that Stresemann's recent monograph on the group (*Verh. Ornith. Ges. Bayern*, xii, pp. 377-404 (1916)) is not accessible to me I do not propose to attach any subspecific name to these birds. Wing 335 and 338 mm.

115. *DICAENUM CRUENTATA IGNITA* (Begbie).

Dicaeum cruentatum, Sharpe, *tom. cit.* p. 15; Robinson and Kloss, p. 78.

a. ♀. Telok Wau, Terutau, 23rd-29th December 1916. [Nos. 3714-7, 3737, 3772, 3790].

"Iris dark hazel, bill and feet black, basal half of bill slaty."

In view of Gyldenstolpe's identification of specimens from Koh Lak, Siamese Malaya, with the reputed Chinese and Hainan form, *D. c. coccinea*, (Scop.), I have again gone through very carefully the very large series of this species in the F.M.S. Museums, in the light of Hartert's remarks on the subject, Nov. Zool. xvii, p. 243 (1910).

Begbie's specimens came from somewhere near Kessang in the territory of Malacca, and it is therefore hardly legitimate to regard specimens from Terutau, 400 miles to the north, as strictly representative of his *Nectarinia ignita*. Our specimens are by no means uniform and while the majority have the outer aspect of the wing glossy purplish one or two have the lesser wing coverts and scapulars with a distinct oily green gloss without purplish. Specimens from Trang are the same but those from Koh Pennan and Koh Samui have but little purple tinge and must therefore be regarded as *D. c. coccinea* if we are to recognise that form. In addition these specimens have the red parts of the plumage more vermilion and less scarlet, but this may be due either to age of the bird or of the feathers. The females are certainly not more rusty orange above as Hartert says is the case with Hainan specimens. Hartert has not defined the limits of his three forms, at least so far as the typical *D. c. cruentata* is concerned and it would appear that they all converge somewhere in the region of Southern and Western Siam.

116. *DICAENUM TRIGONOSTIGMA* (Scop.).

Sharpe, *tom. cit.* p. 38; Robinson and Kloss, p. 78; Robinson, *antea*, vol. v, p. 110 (1915).

a-f. 4 ♂, 2 ♀. Telok Wau, Terutau. 17th-23rd December. Nos. 3647-8, 3684-5, 3718-9.

"Iris dark, bill plumbeous green, feet slate."

Common nearly everywhere in the Peninsula.

117. *DICAENUM CHRYSORRHOEUM*, Temm.

Sharpe, *Cat. Birds Brit. Mus.* x, p. 44 (1885); Robinson and Kloss, p. 78; Robinson, *Ibis*, 1915, p. 756; Gyldenstolpe, p. 36.

a, b. 2 ♂. Telok Wau, Terutau. 21st-28th December 1916. Nos. 3707, 3776.

Rather rare in the north of the Peninsula; we have only one specimen from Trang.

118. CYRTOSTOMUS FLAMMAXILLARIS (Blyth).

Cinnyris flammaxillaris, *Gadow, tom. cit.* p. 83.

Cyrtostomus flammaxillaris, *Robinson and Kloss*, p. 74; *Robinson, antea* vol. v, p. 151 (1915); *Gyldenstolpe*, p. 33.

a. ♂. Telok Wau, Terutau. 27th December 1916. [No. 3766].

Common in Trang, on Terutau and Langkawi and also on the Butang Archipelago further west, extending as far south as Penang Island. In the Malay Peninsula is a littoral and open country species not found in heavy forest.

119. LEPTOCOMA BRASILIANA (Gm.).

Certhia brasiliana, *Gm. Syst. Nat.* I., p. 474 (1788); *Oberholser, Smithsonian Misc. Coll.* 60, p. 18 (note) (1912).

Leptocoma hasselti, *Robinson and Kloss*, p. 77; *Robinson, Ibis*, 1915, p. 757. *Robinson, antea*, vol. V, p. 152.

a. ♂. Burau, NW. Langkawi. 14th December 1916. No. 3635.

"Iris, bill and feet black."

Abundant along both coasts of the Peninsula, from Singapore to the extreme north, but never, so far as my experience goes, at any distance from the sea. Possibly because, like many of the family, this species likes sunny, open spaces and flowering shrubs.

AETHOPYGA SIPARAJA CARA, Hume.

Aethopyga cara, *Hume, Stray Feath.* ii., p. 473 (1874); *Robinson, antea*, vol. v, p. 151 (1915).

Aethopyga siparaja, *Robinson and Kloss*, p. 74.

Aethopyga siparaja cara, *Robinson, Ibis*, 1915, p. 757.

a. ♂. Burau, N.W. Langkawi. 12th December 1916. [No. 3622.]

b-d. 2 ♂, ♀. Telok Wau, Terutau, 26th-29th December 1916. [Nos. 3743-4, 3791.]

"Iris dark, upper mandible black, lower yellowish brown, feet dark brown."

Rare on Langkawi, fairly common on Terutau among the mangroves and on bushes in open country bordering heavy jungle.

Comparison with topotypical specimens of the true *Ae. siparaja* (Raffles) from West Sumatra, confirms the differences already noted between these forms and in addition it would appear that in *Ae. s. cara* the metallic feathers of the crown extend further back, almost to the level of the ear-coverts.

120. ANTHOTHREPTES MALACCENSIS (Scop.)

Robinson and Kloss, p. 76; *Robinson, antea*, vol. V, p. 152; *Robinson, Ibis*, 1915, p. 757; *Gyldenstolpe*, p. 34.

a-i. 4 ♂ ad 1 ♂ imm. 4 ♀. Telok Wau, Terutau. 21-28th December 1916. [Nos. 3708, 3754, 3762-3, 3767-9, 3683.]

j-k. 1 ♂ ad., 1 ♂ imm. West Side, Pulau Telibun, Trang, S.W. Siam. 1st January, [Nos. 3798-9.]

"Iris chestnut, bill black, feet dull yellowish green."

Common, as elsewhere, wherever there were coconut palms.

121. CHALCOSTETHA CALCOSTETHA (Jard.)

Chalcostetha insignis (Jard.); *Gadow, Cat. Birds Brit. Mus.* ix, p. 12 (1884).

a-d. 4 ♂. Telok Wau, Terutau. 27th-28th December 1916. [Nos. 3764-5, 3780, 3793].

This gorgeous sunbird is almost entirely confined to the mangrove zone where in certain localities it is very common. We have it from Penang; Pulau Pintu Gedong, Selangor Coast; Pulau Tinggi and Pulau Sri Buat, East Coast, Malay Peninsula.

For the inconvenient change of name from the more familiar *Ch. insignis* cf. *Oberholser, Smithsonian Misc. Coll.* 60, p. 17 (1912).

112. CHALCOPARIA SINGALENSIS (Gm.).

Motacilla singalensis Gm. *Syst. Nat.* I. pt. 2, p. 964 (1879); *Oberholser, Smithsonian Misc. Coll.* 60, p. 21 (1912).

Chalcoparia phoenicotis (Temm.) *antea*, vol. v, p. 106; *Gyldenstolpe*, p. 34.

a. ♂. Telok Wau, Terutau. 29th December 1916. [No. 3792].

Oberholser (loc. cit.) has pointed out that though the locality is erroneous Gmelin's *Motacilla singalensis* is the first name for this species and must be used and he has designated Malacca as the type locality.

C. phoenicotis (Temm.) Pl. Col. 108, fig. 1; 388, fig. 2 (1824), type from Java, is available as a name for the Indo-Malayan bird from Java, Borneo and Sumatra if separable, which on comparison of birds from Selangor with one from the West Sumatran coast appears not to be the case.

The Continental bird, except that from "Malacca" is at present without a name, but the adult bird from Terutau above listed and a female from Bandon appear to differ from Southern Malayan specimens in having the yellow of the lower surface decidedly brighter and less green and the rufous of the throat and upper breast somewhat lighter and not carried so far down. Wing about 53 mm. in the specimens above mentioned.

XXII. BELIEFS, CUSTOMS, AND FOLK-TALES OF THE BEHRANG-VALLEY SENOI.

By IVOR H. N. EVANS, *Assistant Curator & Ethnographical
Assistant, Federated Malay States Museums.*

Early in the present year (1917) I had an opportunity of visiting a small group of Sakai who were living near the Behrang River, in Perak, about eight miles north of Tanjong Malim. As they were a somewhat civilized community their technology was not particularly interesting, since they had given up making many of the articles worn, or used, by the wilder tribes. I spent rather more than a fortnight in their village, and found them friendly and willing to give information with regard to their beliefs and customs. They told me that they maintained relations both with the *Sənoi* (Sakai) of the Slim Valley, whom they called *Mai Sliþ*, and with the tribe, seemingly of mixed Sakai-Jakun origin, which lives near Kerling in Selangor, and speaks Malay as its mother tongue. These are the nearest neighbours of the Behrang *Senoi*, who inhabit the neighbourhood of the Behrang and of the Bil Rivers. The Kerling people they allude to as *Mai Məluar* (outside people), or sometimes as *Mai Renyup*, from the fact that they use a word "*nyup*:" meaning "is not," in their dialect, which is equivalent to the ordinary Malay phrase *tiada*.

Marriages between Behrang *Senoi* and *Mai Sliþ* or *Mai Məluar* seem to be not infrequent, one woman that I met having been married to a Slim man (and divorced); and another having come from the Kerling tribe. Divorce seems to be fairly common, and I was told that in this respect men and women are on a footing of absolute equality, a permanent separation, with freedom to marry, taking place at the wish of either party. With the exception of theft serious crimes are rare, and Katil the headman of the settlement said that even this was not punished, nor did it lead to blows among the parties concerned. If the owner of stolen property found another in possession of it, he would merely take it away, and upbraid the thief.

The dialect spoken by the Behrang *Sənoi* belongs to the Central Sakai group, but contains a fair number of Malay words. These may either have been taken directly from the local Malays, Sumatrans from various districts, who are, comparatively speaking, new-comers, or may have been introduced through contact with their neighbours, the *Mai Məluar* of Kerling.

The houses of the Behrang *Sənoi* are little different from those of Malays and present no special features of interest. Their blow-pipes are of the Batang Padang type, with the exception that the mouthpieces, which are slightly hollowed at

the ends, are made of guttapercha instead of wood. All the dart-quivers that I saw were of the hard round-topped variety, which is found in the south of the Batang Padang district of Perak. One article of some interest that I purchased was a bamboo comb—an old specimen—which was decorated with very minute and finely-executed scratched-in patterns. The only other objects worth recording that I managed to buy were some ceremonial articles used by *Halaks* (Shamans). These I treat of below.

BELIEFS AND CUSTOMS CONNECTED WITH AGRICULTURE

The Behrang *Sěnoi* have a number of customs connected with agriculture, and I suspect that I have not by any means obtained all of them.

In clearing jungle for planting rice the brushwood is cut away before the large trees are felled. The Sakai, when beginning to make a new clearing, work for three days at cutting down the undergrowth, and then rest for a day. This is called *pahantak kěrnor*; that is the cutting-of-brushwood tabu (*kěrnor*, I am told, is equivalent to *těbas* in Malay). When the undergrowth has been disposed of the people set to work on the big trees and, after felling for three days, they take another day's rest for *pahantak gani*, or the felling tabu (*gani* has the same meaning as the Malay word *těbang*).

In sowing dry-growing rice the fourth day from commencement is a rest-day for *pahantak mēnugal¹ bah*, the padi-sowing tabu.

At reaping, the rice-soul is taken on the first day, and consists of seven ears. The fourth day of reaping is a rest day, *pahantak kenod bah*, the tabu at the reaping of the rice. On this day things must not be carried down from the houses to the ground, though anything may be taken up into them. If an article were removed from a house, the rice-soul would follow it and be lost.

CUSTOMS AND BELIEFS WITH REGARD TO STORMS.

The *Sěnoi* of the Behrang Valley, like most, if not all, of the other wild tribes of the Malay Peninsula, are much afraid of thunder and lightning, and it is thought that should certain prohibited acts be done, without taking steps to avoid the consequences, the village of the offenders would be struck by lightning and destroyed. In a former number of this "Journal" I have given a list of some of the prohibitions which are in force among the Sakai of the Ulu Sungkai, and those that I was made acquainted with by Katil are somewhat similar. For instance, a monkey must not be dressed up and laughed at; a cat and a dog must not be set to fight; jungle leeches, *malau* (a kind of gum), lice, bugs, *jělotong*-wood,

¹ *Mēnugal* is a Malay word.

ipar-wood (?), rattan canes of the species known as *kerai*, and two kinds of creepers (called *dagut* and *chinchong*), must not be burnt in the fire of the cooking-place. It is also forbidden to roast or boil the flesh of the *Bĕrok*, or of the *Kĕra*-monkey, at a fire on which dried fish has been cooked. In addition the notes of many kinds of birds and insects must not be imitated when heard, for instance that of the cicada. Even such actions as playing with the sand by the river-side and laughing loudly, as children like to do, or looking into another person's face and laughing, are, according to their ideas, capable of bringing on one of these disastrous storms.

Katil told me that a few months before my visit a man had cooked a piece of dried fish in the jungle, making his fire, without thinking about the matter, at the foot of a clump of rattan-palm of the kind known as *rotan kĕrai* (*Damonorops geniculatus*). As a result of this, a violent thunder-storm came up before he had finished eating. On realizing what he had done, he took his working-knife and cut his foot with it (presumably with the intention of propitiating the Spirit of the Storm); then, on the blood gushing out, the storm stopped. He had only intended to make a superficial cut, but found that he had wounded himself so badly that he had to be carried home by his companions.

Thunder-storms caused by the infraction of one of these prohibitions are called *terlak dok* ("Bĕrok storms.")

In this connection, *chilan*, which I understand from the Sakai of the Ulu Sungkai to be lightning, was said by Katil to mean "thunder storm," but this is not supported by the comparative vocabulary in Skeat's "Pagan Races" where *chilan*, cognate with *kilan* (Malay) "to glitter," is recorded as meaning lightning among the Sakai of the Korbu Valley. *Ungku* was given to me as the word for "thunder," and is not uncommon in various Sakai dialects. *Ungku*, *Turul*, or *Nanchet*, moreover, is the spirit who makes the thunder. His young brother, *Bonsu*, asked him to go with him to a place above the sky, but *Turul* (*Ungku*) would not consent, as he wished to remain below to cause trouble on earth. *Bonsu* thus left him below, where he remains till the present day. *Turul* has four children, three of them females, *Wah Hilong*, *Wah Hideh*, and *Wah Dampĕh*; the fourth, *Puntok Keboie*, a male.

While I was with the *Sĕnoi* I had an opportunity of seeing how they behave during a storm, for on two successive evenings there arose a high wind with distant thunder and lightning. On the first evening, while the wind was blowing in violent gusts, I heard the people in the next house calling out loudly, and I asked Katil, who was with me, what they were saying. I did not, however, go into the matter deeply then, as I thought that he might be reluctant to talk about the storm while it was still raging. On the second occasion most of the people of the settlement were in the hut in which

I was staying, when the wind came sweeping down from the hills. They were obviously rather frightened, and one old woman kept angrily shouting out orders to the storm to stop, not leaving off until it had almost done so. On that evening, and on the next morning, I got Katil to tell me a good deal about his people's ideas with regard to storms of wind.

It appears that the *Sēnoi* think that during strong storms of this kind, the spirits of the old dead (*kemoit rah*), and the spirits of those who have died more recently (*kemoit pai*, "new ghosts"), are roaming over the earth.

The charms, if they may be called so, which the Sakai shouted out to compel the storm to cease were as follows:

1. "*Sidung!*"¹ a Perak Malay word meaning to "abate."
2. "*Kipus sa'blah!*" meaning "fan to one side" (Malay).

I was also told that the Behrang *Sēnoi* frequently call out to the *buntal*-fish (a fish which is capable of distending its body) to suck up the storm ("*Isap buntal!*"), and that sometimes they cry, "*Wok mat! Wok lemoin!*" In this last I understand the meaning of the individual words, but I cannot attempt a translation. *Wok* means either "shadow" or "spirit," *mat* means "eyes," while *lemoin* is "teeth." As far as I could find out from Katil the expression is something to do with the belief that loud laughter will bring on a bad storm. I imagine that the charm is used for neutralizing the effect of previous laughter.

During very bad storms indeed the *Sēnoi* assemble under their houses and burn *judam* (extract of aloes?) and evil-smelling rubbish to scare away the storm.

CUSTOMS AND BELIEFS WITH REGARD TO FOOD.

Among the *Sēnoi* of the Ulu Behrang (as also among the Sakai of the Ulu Kinta) it is forbidden to mention the usual names of certain animals when their flesh is being eaten. Of the secondary, and almost invariably descriptive names, I give some examples below, together with their meanings.

| ENGLISH NAME. | ORDINARY NAME APPLIED <i>Sēnoi</i> TO ANIMAL WHEN NAME. BEING EATEN. | | |
|------------------------------------|--|-----|--|
| 1. Deer (<i>Cervus unicolor</i>) | . Rusa | ... | <i>Leuk pos.</i> |
| 2. Pig-tailed Macaque | ... Dōk ⁿ | .. | { 1. <i>Leuk sabat.</i> 2. <i>Leuk karuk.</i> |
| 3. Crab-eating Macaque | ... Rau | ... | <i>Leuk kempuk</i> |

¹ In this sense it seems to be equivalent to the English slang phrase "shut up."

| ENGLISH NAME. | ORDINARY NAME APPLIED Sēnoi TO ANIMAL WHEN NAME. BEING EATEN. | |
|---|---|--|
| 4. Siamang (<i>Symphalangus syndactylus</i>) | ... Hūl ... | <i>Leuk gantok.</i> |
| 5. White-handed Gibbon (<i>Hylobates lar</i>) | ... Tonh .. | <i>Leuk gantok.</i> |
| 6. Bear | ... Bērūok ... | <i>Leuk tebul.</i> |
| 7. Porcupine | ... Kūs ... | (1. <i>Leuk chenor.</i> (2. <i>Leuk pachor.</i> |
| 8. Wild-pig | .. Gau .. | <i>Leuk teh.</i> |
| 9. Benturong (<i>Arctictis binturong</i>) | Tēnyūk .. | (1. <i>Leuk senyūp.</i> (2. <i>Leuk bukok.</i> |
| 10. Lotong (<i>Pithecus</i> sp.) | . Besīk ... | <i>Leuk danum.</i> |
| 11. Bamboo-rat | .. Lekat .. | <i>Leuk tengkak</i> |
| 12. Soft tortoise (<i>Trionyx</i>) | ... Pa-as ... | <i>Leuk tehau.</i> |
| 13. Tortoise (the species which the Malays call <i>Baning</i>) | .. Sil .. | <i>Leuk gersūk.</i> |
| 14. Tortoise (the species which the Malays call <i>Kura</i>) | ... Kūrāk ... | <i>Leuk hok.</i> |

The following are the meanings of the various secondary names, so far as I could obtain them.

No. 1a. *Leuk pos.* *Leuk* in all these names, which I have translated "meat," signifies "animal food" (fish or flesh). It is exactly equivalent to, and obviously the same as, the Malay word *lauk*. The stag is called *leuk pos* (i.e. wind meat) because of its swiftness in running.

2a. *Leuk sabat* means *sabat* meat, the *sabat* being a spirit, inhabiting the bodies of some kind of animals. *Sabat* is, seemingly, comparable to the *badi* of the Malays.

The second name of the Pig-Tailed Macaque, *leuk karuk* (i.e. rotten-branch-meat) is due to its habit of breaking off, and throwing down, rotten branches. The Sakai told me that this was chiefly done in the early morning in the trees among which the monkeys had slept.

3a. *Leuk kempuk* ("lowland meat"?). I could not get an exact translation of the word *kempuk*, but it seems to refer to the fact that this species of monkey haunts the jungle of the lowlands.

4a. *Leuk gantok* ("hanging meat") from the habit.

5a. of these two species of hanging from branches by their hands.

- 6a. *Leuk tabul* ("kēlulut meat"). This name denotes the fondness of the bear for robbing the nests of bees, especially of a small kind which the Malays call *kēlulut*.
- 7a. *Leuk chenor* or *Leuk pachor* ("thorny meat"). Refers, of course, to the porcupines spines.
- 8a. *Leuk teh* ("earth meat"). Refers to the wild pig's habit of rooting up the soil in quest of edible roots, etc.
- 9a. *Leuk senyup* ("dark meat"). Refers to the Benturong's nocturnal habits. The second name, *Leuk bakok*, seems to have the same meaning.
- 10a. *Leuk damum*. I could get no proper translation of *damum*, but it seems to refer to the habit of individuals of this species of sleeping together in companies during moonlight nights—like fowls in a fowl-house, as the Sakai said.
- 11a. *Leuk tengkak* ("root meat"), the name being given owing to Bamboo-rats making their holes in the bases of clumps of bamboos.
- 12a. *Leuk teheu* ("water meat"). The soft-turtles live in ponds and rivers.
- 13a. *Leuk gersuk* ("stone meat"), because this species of tortoise may easily be mistaken for a stone if seen from a little distance.
- 14a. *Leuk hok* ("cocoanut-shell meat"), because the carapace looks like a cocoanut-shell.

The calling of any of these animals by their ordinary names while their flesh is being eaten will cause the offender to suffer from colic. I fancy, however, that the observance of these customs is becoming somewhat neglected by the *Sēnoi* of the Behrang Valley.

Another belief with regard to food is that a man whose food is played with by someone else will suffer from colic (*vide* belief with regard to the *Baleh Busud*, *infra*, p. 204).

Katil told me that, among the Sakai of the Slim Valley women and children did not eat the heads of *Bērok* and *Kera* monkeys (*Macacus nemestrinus* and *M. cynomolgus*), because of the *sabat* which resides above the eyes in these animals. Infraction of this rule, it was thought, would cause them to suffer from violent pains in the head, which might even be a cause of death. The custom is not observed on the Behrang River.

It is not allowable to cook turmeric with pig's flesh; the breaking of this rule will entail the transgressors falling ill with jaundice and fever.

Animals shot with the blow-pipe must not be eaten with turmeric, or acid fruits; otherwise the poison used on the darts will prove ineffective when the people next go hunting.

Double bananas are not eaten by young women as it is thought that to do so would entail their giving birth to twins.

VARIOUS BELIEFS.

Diseases are thought to be caused by spirits which come from the direction of the sea, and, in the case of epidemic disease, at any rate, the idea is partly supported by reason, since small-pox, one of the most dreaded disorders, reaches the Sakai through the Malays.

Spirits, of course, are, according to Sakai ideas, responsible for most of the misfortunes encountered by mankind: it is, therefore, necessary to avoid places which they are known to frequent. Thus, travellers in the jungle should not sleep for the night in passes between hills, these being spirit-paths.

When a child is born, the after-birth, with part of the navel-cord attached, is frequently hung on the branch of a tree, or on a bush. The Sakai say that within three days it becomes a scaly ant-eater, the navel-cord forming the tail.

The Behrang Sakai believe that the rainbow is the shadow that arises from the body of a great snake, which lives in the earth. The red of the rainbow is its body, the green its liver, and the yellow its stomach.

They say that tigers set snares for people in the jungle. If a man cuts through the spring-stick of one of these (probably some *liana*) he must not pass on by that path, or he will be caught in an invisible noose.

If blood is seen on leaves in the jungle it must not be touched, or the person who does so will be taken by a tiger.

A spirit is thought to exist, which the Sakai call the *Dana Sirlok* (*Dana* meaning "spirit" and *Sirlok* promise). This attacks persons to whom a promise has been made and broken. Thus, if a man has agreed with another to go on a journey, and subsequently leaves his friend in the lurch, the *Dana Sirlok* will accompany the traveller in his companion's place (being presumably at first invisible) and will attack and kill him in the shape of an elephant, a tiger, or a snake.

Katil was able to throw considerable light on a question with regard to Sakai beliefs which had been giving me trouble for some time. I have mentioned, in former papers on the aboriginal tribes, certain beliefs and customs in connexion with the word *punan*. I knew that there was a belief, common to both the Sakai, Sakai-Jakuns and many of the Malays, that a person going out into the jungle without having satisfied a desire for food, tobacco, or *sireh* would meet with some misfortune, but I had not been able to find out whether evil consequences could be ascribed to spirits. Katil, however, told

me that his people acknowledge a *Dana Punan* (Desire Spirit), who is responsible for ill luck met with by those who have given it an opportunity of causing them trouble.

THE GIVING OF NAMES.

Children are given names as soon as, or soon after, they are born, but these are frequently changed. A child may be named from some event which happened at about the time of its birth, from the river near which it was born, from the settlement in which its parents were living, or from some peculiarity of person or habit.

One youth was named *Jernang* from the river near which he was born, but was more usually called *Si Kork* from a fanciful resemblance to a certain kind of bird, the *tentork*; (*hēchaw*) of the Malays (the racquet-tailed drongo).

A baby girl was given the name of *Tenyuk*, because her parents were keeping a scaly ant-eater (*tenyuk*) as a pet at the time of her birth.

The father of this child, whose name was *Sagap* (meaning "ready") was so called because his birth was expected to occur some time before it actually took place, and thus everything was ready much before it was necessary.

A little girl was called *Krek* (cockle) because her chin was thought to resemble a cockle-shell in shape; another *Puntok* or *Puntong* ("burnt log") because she always liked playing about among the ashes of the cook-house fire.

SENOI OATHS.

Katil, the headman mentioned above, gave me the following example of a Senoi oath, which I believe that I have translated correctly.

| | | | | | |
|----------------|----------------|------------------|-----------------|---------------|--------------|
| " <i>Dideh</i> | <i>mat-jis</i> | <i>eng</i> | <i>sumpah.</i> | | |
| "This | eye-day | I | swear, | | |
| <i>Kalau</i> | <i>eng</i> | <i>pemohok</i> | <i>eng</i> | <i>chiloh</i> | <i>en</i> |
| If | I | lie | I | go down | into |
| <i>tkeu,</i> | <i>chak</i> | <i>bahayak</i> ; | <i>eng</i> | <i>chub</i> | <i>darat</i> |
| water | eat | crocodile | I | go | land |
| <i>chak</i> | <i>keuk</i> , | <i>timpak</i> | <i>karuk</i> !" | | |
| eat | tiger | hit by | rotten tree !" | | |

"This is the sun that I swear by. If I lie, may a crocodile eat me when I go down the river: and when I travel on land may a tiger eat me, or may I be struck by a falling tree !"

THE HALAK.

The *Halak* (Shaman) is found among the *Behrang Sakai*, as among other *Sēnoi* tribes. *Katil*, who, shortly before our arrival, had been performing some magical rites for his

own benefit—he was suffering from a bad cough—told me, however, that he could not claim to be a true *Halak*, since he did not possess a *Gunk* (Familiar Spirit), but that he merely followed ancient custom in “playing” a little to try and cure his complaint. The rites had been carried out in a small one-roomed house, specially built for the purpose. The walls of this only reached half way up to the thatch, and a doorway at the back opened on to a small boat-shaped platform (*Balai lëndut*), about eight feet long, and on a level with the floor of the house. This was supported on three trestles, made of six small trees felled at the roots and crossed in pairs below it. Their lower branches had been trimmed away, but their upper parts, still bearing branches, projected above the platform to a height of about seven or eight feet on either side. Two rails had been lashed to the trunks of the trees about three and a half feet above the flooring while a rattan cord girdled the trees near their tops, each extremity of it being attached to the end wall of the house. The branches of the trees, when the structure was first erected, had been covered with leaves, but, at the time of my visit the foliage had withered and fallen. A number of long water bamboos of large diameter, ornamented with wavy double lines running longitudinally, were placed at the far end of the platform, leaning against the rattan cord. Katil pointed out that one of these was longer than the others, having seven internodes, as compared with six. This long bamboo was used by the chief performer for ceremonial bathing; the others by the rest of the people. The bases of these bamboos were slightly ornamented with carving.

Hanging on the rails of the *Balai lëndut*, and suspended from the roof within the house, were various ceremonial ornaments. Some of these were made from palm-leaves plaited into fanciful shapes, among them being decorations for which the Sakai gave me the following Malay names, *gèlang giring*, *gèlang rantai*, *burong dènak*, *tuli dendan*, *tuli liong*, and *tali sawit*. Other decorations of the same class for which I obtained Sakai names were *layang-layang hut* (“ascending swallows”); *layang layang chiloh* (“descending swallows”); *tuk keh-ep* (“centipedes’ feet”); *semrong tumpi* (?), and *plek jeh-or* (“fruit of the cocoanut”). Two small pyramidal structures, made of *bèrtam* pith, and of slightly different types were suspended inside the house. These, each of which had a doorway and model steps leading up to it, were called *balai sagi*: and *balai krauk* (*krauk* is equivalent to *kèrawang* in Malay). The *balai sagi* was the most ornamental of the two and was crowned by a figure of a bird (*chiap cheralah*), model *tampoi* and *rambai* fruits (*pleh tampoi* and *pleh rami*) and decorations called *sarak luie* (i.e. bees’ nests). Other ceremonial objects were shaved sticks (*chendrok*), the shavings standing out from the stems in circles at short but regular intervals; hanging decorations called *patong salang*, made of two small pieces of thin board intersecting at right-angles: *patong gimbar*, hanging ornaments

made from four small pieces of board intersecting at right-angles so as to enclose a square, and having their ends projecting; two types of head-dress (*chungkuie bulang* and *chengkul le pang*) made of leaves; two Halak's switches, one made of *lebuk*-leaves (*s'lak selebok*), the other of leaves of the *bértam* (*s'lak bertop*); and bands of tree-bark (*tempok luat*) with rough patterns drawn on them in yellow or black.

The Halak's *balai* (a circular frame of rattans with a thick fringe of finely shredded leaves depending from it), within which he chants his spells, was also hung from one of the beams of the "medicine"-house. This *balai* was in all essentials similar to that which I have already described and figured in a former paper on the Sakai of the Ulu Sungkai.¹

Katil told me that among his people the Halaks performed by torch-light, while the Slim Valley Senoi held their performances in total darkness.²

He also said that the seances, which had taken place before our arrival, had been kept up for six consecutive nights, and that ceremonial bathing from the decorated water-bamboos (*kenas*) took place after the performances were finished, and shortly before daylight.

With regard to Sakai beliefs that *Halaks* become tigers, Katil told me that a *Halak's* ghost rose, usually on the fourteenth day after burial, and assumed that shape.

BURIAL AND EXISTENCE AFTER DEATH.

While living with the Senoi I had an opportunity of inspecting several graves, which were situated in the jungle at a little distance from the settlement, and at the base of a hill. None of these, which were close together, were very recent—the newest was, I believe, at least a couple of years old, probably more. Their sites were marked by narrow mounds, about as long as the bodies of those buried below. In two cases these mounds had undressed upright stones set up at the head and foot of them, one being covered, in addition, with water-worn stones from the river. Another grave had small *Sungkai*-trees planted round it, while in a fourth the mound had partly fallen into the burial-chamber below. Katil told me that slight huts of the lean-to type are erected over new graves, and that articles, such as adzes and blow-pipes, which must be either bent or broken, are placed within the hut. No remains of huts or offerings were, however, to be seen on the graves that he showed me, and he explained that they had rotted away.

¹ "Journal of the F M S Museums" vol VI, p. 98 & pl xxviii

² I have noted in the paper referred to above that the Sungkai people covered up a lamp that I took with me into the hut in which the *Halak* was about to perform

³ Probably in imitation of Malay custom

Katil also said that food is placed at the foot of a grave morning and evening (sometimes only in the morning) for fourteen days after burial, the spirit of the dead man being thought to feed on what is put there for him.

On the fourteenth day the relatives of the deceased hold a feast, and according to old custom—now, I understand, somewhat neglected—no ornaments should be worn or singing indulged in for two months after the death.

Katil's people do not bathe a corpse before burial, because, as he told me, his father's newly-dug grave was destroyed by a heavy rain-storm before the body was placed in it, this being ascribed to the fact that the corpse had been washed.

Graves are dug so that the head of the corpse points towards the east. The body is wrapped in mats or white cloth and placed face upwards.

Katil explained, by means of a plan scratched on the ground, that the grave is dug to nearly the required depth and the bottom then divided into two sections by a line running parallel to its sides. The left hand section (when looking towards the head of the grave) is next carried down to a sufficient depth, below the right hand, to receive the corpse. When the body has been placed in this deeper section, stakes are fixed slantwise across the bottom of the grave, their points being driven into the shallower (right hand) section, and their ends abutting against the side wall of the grave adjacent to the excavation in which the corpse lies. A covering of tree-bark, or of sheets of bamboo, is then placed over the stakes, the body thus being protected by a sloping roof. After this earth is piled up on the covering until the excavation is full, and the mound formed.

To turn now to *Senoi* ideas with regard to the soul and its survival after death. As far as I could ascertain from the Behrang Sakai, a man's soul and his shadow are regarded as one. The word *kemoit*, which I have mentioned above, seems to mean the ghost of a dead man, but the soul, or shadow, is referred to as *wok* or sometimes as *bayak* (cf. the Malay *bayang*, a shadow). The *wok* is said to leave a man's body during sleep, but does not usually go very far afield, in case it should not be able to return. The *kemoit*, as I have already stated, are supposed to be roaming the earth when violent winds are blowing. They are evilly disposed and hunt the souls (*wok*) of men, which take the forms of animals (often of the Muntjac). This is known because people in their dreams have seen the *kemoit* thus engaged. Those whose souls have been hunted fall sick.

The Sakai frequently speak of human beings as *man papat tujoh*, "people of the seven boards." It appears that the earth is thought to consist of seven layers or boards, while the region above the earth consists of six (*papat anam*), as does also that under the earth. Both the regions above and below the earth

are occupied by spirits who look like human beings. The *kemoit* (ghosts of the dead) live in the region above while, like men, some are blind and some are lame. Possibly they may also be thought to inhabit the underworld, but I omitted to make enquiry with regard to this point. The *mai paput tujoh* are said to be *beket* (hot) and therefore die; the *mai paput anam* are *senam* (cold) and do not die.

Another story makes the souls of the dead go to the Island of Fruits (*Pulau Bah*) where the *durian* and other fruit-trees are in bearing all the year round, and where men, when they are old, again become children, and again grow up. I am, however, rather inclined to think that this legend may have been borrowed from tribes further to the south.

The Behrang Sakai believe in grave-ghosts, *Dana Kubor* (equivalent to the Malay *Hantu Kubor*) besides the *Kemoit*.

It used to be customary to desert a settlement when a death occurred, but Katil told me that this is now not usual. The reason given for the desertion was that the survivors thought, since one of their relations had died there, that the locality must be haunted by spirits. Katil made it plain that they were not frightened of the ghost of a friend, but of the evil spirits which had attacked him (or her) and caused his last illness.

A curious little story having some reference to death is given below. It was told me by Katil.

"When anyone dies, the people of settlements distant from the place sometimes get to know of the death in this way.

Two spirits, which are known as *Baleh Busud* (Virgins of the "Ant"-hill) and look like little girls, sit on a "male"¹ nest of the termite. One of them is heard to laugh as she rolls the dead man's skull down to the mound, and the other says to her, "*Leuk jik, jangan chikak*" ("Don't "colic" my food!").

FOLK-TALES.

The Behrang Sakai have a large number of folk-stories, of which I obtained several. Two of these I give below. I have chosen those which seemed to me most likely to be truly indigenous, and not borrowed from the Malays.

Folk-stories, Katil informed me, should be told at night, as this brings good luck in hunting animals in the jungle. A man who told folk-stories during the day-time would, he said, hurt his foot against a stump. I gathered, however, that this latter was a popular saying rather than a strong belief. It may be remarked that it is always the youngest-born son (Bonsu) who is the clever man in these *Senoi* tales.

¹ The "male" nests are those which are long and pointed.

THE COCKROACHES' VILLAGE.

Told by Katil.

There was once a man who had seven male children. Their names were Sulong, Tengah, Alang, Ruh, Penangkap, Bumbun, and Bonsu Api.

One day the eldest son (Sulong) went off into the forest to hunt for game, and far away from his home came upon an *ara*-tree (*Ficus* sp.) in fruit. He sought out a convenient place at some distance from the tree to make a shelter for the night, and there he slept.

Early in the morning he went to the tree and climbed up into it with his blow-pipe to shoot the monkeys, birds and squirrels, which came in hundreds to eat the fruit.

The tree was on the top of a hill, and below the hill, on one side, though hidden from view, was a clearing. While he was in the tree he heard people laughing and the cries of children coming from the clearing. So he came down from the tree and, making his way towards the sounds, eventually arrived there. He entered a patch of sugar-cane and came across a fowl which cackled loudly. Next he came to a house and saw a mortar in which he had heard somebody pounding padi. Then he called aloud, "Hoi, sister! Hoi, sister!" but nobody answered, and going up into the house he found that the people had vanished. He saw food ready cooked there and said to himself, "What am I to do, for I am hungry? If this is spirits' food it will be savourless, but if for human beings, it will be salt."

So he tasted the food and found that it was salt and, thinking it safe to do so, ate until he was satisfied. After this he took water and drank it, and then he took *sirih*, which was also set out there, to chew. Now the first quid that he chewed tasted sweet, the second rich, the third intoxicating, and the fourth sweet. Then feeling giddy, he lay down on some mats which were spread in the house. When he had fallen into a stupified sleep, the people of the house, who were all women, but who had become cockroaches at his approach, came out of their lurking places and ate his body till little remained to him but his life. At last, on his awaking, they killed him with billets of wood.

Now, as he did not come home, the second brother set out to look for him and came across the hut in which he had spent the night. Here he slept, and in the morning he went to the *ara*-tree where, on the previous evening, he had found his brother's blow-pipe, dart-quiver, and spear, together with the rotting bodies of the animals that he had shot. He also climbed up into the tree and shot some of the animals and birds which were eating its fruit, and towards mid-day, while still in the tree, he heard the sound of people pounding rice and of laughter coming from the place where the clearing was

situated. So he said to himself, "Perhaps that is where my brother went." Then he climbed down from the tree, and, heaping together the bodies of the beasts that he had shot, he left them there with his blow-pipe and chopper and went in the direction of the sounds. When he got to the patch of sugar-cane the hen cackled loudly (and, as before, the people of the house became cockroaches and hid themselves). He, too, on coming to the open space in front of the house called out, "Hoi, people! Hoi, sister!" but nobody answered him.

So he went up into the house and found no one there, but food and *sirch* set out ready. He waited for some time, but as nobody came, and he felt hungry, at last he said, "If this is the spirits' food it will be savourless, but if for human beings it will be salt." Then he tasted the food, and finding it salt, ate his fill. Next he drank water and after this he took *sirch* and chewed it. The first quid that he chewed tasted sweet, the second rich, the third intoxicating and the fourth sweet. And he also felt dizzy and went to sleep. Upon this the cockroaches came out and ate him up; and they hid his bones under a big cauldron, where they had also hidden those of his brother.

Now when he did not come home either, the third brother took up the search, and met with the same fate, as did also the fourth, fifth and six.

At last the youngest brother, Bonsu Api, said to himself, "How is it that my brothers do not come home?"

That night his grandfather came to him in a dream, and he asked him how it was that his brothers had not returned, and where they had gone to.

The grandfather replied that they had not come home because they had been killed by the Cockroach Demons (*Rengkasi*¹ *Lipus*).

"What am I to do about them," said Bonsu Api, "and how am I to kill them?" "You must give *chënduai*² to them," said his grandfather.

Then Bonsu Api awoke and, remembering his dream, he thought that he also would follow his brothers. So he told his father and mother of his desire and, having made his preparations, on the next morning he set out.

He, too, came to the hut where his brothers had slept and found the fruit-tree, where they had left their blow-pipes and quivers; and the heap of rotting game under the tree was as big as a large ant's-nest, and the quivers and blow-pipes, which had been left there by the brothers who had preceded him, were already partly destroyed by "white-ant."

Then he thought of what his grandfather had said to him in his dream. So he also climbed up into the tree and shot the

¹ *Rengkasi*, the Malay *Gēgasi*

² A herb from which the Sakai make love-charms.

birds and animals that were feeding on the fruit. After a while he, too, heard voices from the clearing, and, coming down from the tree, noticed that the track made by his brothers led in the direction whence the sounds arose. Now when he neared the clearing he lit a cigarette into which he had put *chēnduai*, and observing from where the wind was blowing, found that it was from him and towards the clearing. Then he went carefully in that direction and came to the house, where he heard the people complaining and saying that they could not keep awake, for they were made sleepy by the fumes of the *chēnduai* that he kept blowing towards them as he smoked his cigarette.

Then each woman in the house left her work and fell asleep. So Bonsu Api went up into the house, and saw the floor covered with women lying there; for they had not had time to become cockroaches before they were overwhelmed by the fumes of the *chēnduai*.

So he went through all the rooms and at last, in the upper storey, he found a beautiful princess, who was awake, since the *chēnduai* fumes had not reached her. Then he threatened to kill her, but she besought him to relent, asking him why he should wish to do so. Thereupon he told her that her followers had killed his brothers, and she replied that, if it were true, she knew nothing of it, for she seldom left her room.

So he pardoned her on condition that she should find out what had been done with the bodies of his brothers: but the people below slept on and could not be wakened. However, the princess at last found the bones of the six brothers below the cauldron. Then Bonsu Api took the bones and heaped them together in front of the house. And he told the princess to follow him, saying that he would kill her if she did not. So she consented, and made ready for the journey. Now when she had come down from the house, Bonsu Api shut the door and set fire to the walls and roof, so that all the people inside began to be burnt. And Bonsu Api spoke to them and said, "If you wish to live, become cockroaches for ever, not sometimes cockroaches and sometimes human beings; and in future eat the fragments of food that are left by mankind." So they became cockroaches.

As for Bonsu Api he brought his brothers to life again and went home, taking them and his princess with him.

BONSU AND TAK KEMOIT.¹

Told by Katil.

A youth named Bonsu (youngest-born) was once wandering in the jungle. He came from the going down of the sun, the Island of Fruits (*Pulau Buah*). As he was journeying he came to a *tampoi*-tree on which the fruits were light coloured and unripe. He took off his dart-quiver and his chopper, and

¹ *Tak Kemoit* (Grandfather Ghost).

putting them and his blow-pipe down against the tree, went to sleep.

He slept on and on, until the fruit of the tree was ripe, and at last a single fruit fell on his chest and awoke him with a start. So seeing that the fruit had ripened, he climbed up into the tree and ate a little of it. Then he called aloud, saying, "If there is anyone in this country let him come and eat fruit." But nobody answered him. He ate some more fruit, and again called out as before, and this time he heard a voice answering him from the direction of the going down of the sun, "Where are you, grandchild?" "Here I am, grandfather," said he. Thus they kept on calling and answering one another until the new-comer was close at hand. Then Bonsu saw that the stranger was an old man with red and deeply sunken eyes.

Now the old man began to eat the fruit, swallowing it branches, leaves and all; and when he had satisfied his hunger he said to the youth, "Your grandfather wishes to relieve himself." Then Bonsu replied, "If grandfather wishes to relieve himself, let him go far away down-stream." So the old man started off, and after a while he called out, "Where shall I relieve myself?" and Bonsu answered, "Far away down-stream." In a little while he called again, asking the same question, and Bonsu answered him as before; for he was frightened that the old man would eat him, having seen how he had swallowed the fruit, branches, leaves and all. Thus they went on calling and answering until neither could hear the other.

Then Bonsu came down from the tree and ran away till he saw a plain by the edge of the sea, where a *pinang dara*¹ and a *birah*-plant² were growing side by side near the shore. When he reached them he called to him wild pigs, wood-peckers, and porcupines, and they came. So he told them that, if the old man, the Red-Eyed Spirit, came to the place and climbed up into the *birah*-plant to follow him, they were to wait until it had grown up to the sky, and were then to cut it down. This they promised to do. Then Bonsu climbed into the *pinang*-tree and sang,

"Tinggi, tinggi batang pinang!
Tinggi rendah puyoh Mēlaka!
Aku takut Hantu Merah Mata!"³

and the *pinang*-tree immediately grew up into the clouds carrying him with it.

¹ A betel-nut palm which has not yet born fruit.

² A kind of aroid?

³ A Malay verse (*pantun*)

High, high is the *pinang* trunk!
Tall and stumpy are the quails of Malacca
I'm frightened of the Red-Eyed Spirit!

Not long afterwards the *Hantu Merah Mata* came to the spot and, seeing that Bonsu had gone up to the clouds on the *pinang*-tree, climbed into the *birah*-plant and chanted,

“*Tinggi, tinggi batang birah !*

Tinggi rëndah puyoh Mēlaka !

Aku takut Hantu Merah Mata !”

and the *birah*-plant immediately grew upwards, carrying the Red-Eyed Spirit with it. But the Red-Eyed Spirit could not catch Bonsu because he had reached the sky.

Then Bonsu called out, “Ancestor, open the door!” So his ancestor¹ opened the door, and he went in and shut it again. Upon this the pigs, the woodpeckers, and the porcupines cut away the stem of the *birah*-plant so that it fell into the sea carrying the Red-Eyed Spirit with it; and he was drowned.

¹ This is Ungku (Turul) who governs thunder and lightning. Bonsu of this story is not, of course, Ungku's brother of the same name

XXIII. ETHNOLOGICAL MISCELLANEA.

By IVOR H. N. EVANS, *Assistant Curator and Ethnographical Assistant, Federated Malay States Museums.*

SETTING UP THE POSTS OF A MALAY HOUSE.

While staying at Pianggu on the Endau River in 1917 I was lucky enough to be present at the ceremony of setting up the posts of a Malay house. When I arrived on the site of the new dwelling the holes for receiving the posts had been already dug and the posts themselves, conveniently disposed, were lying in pairs, with cross-beams attached, ready to be set up. The proceedings were begun by a broken fragment of a small silver coin, wrapped in white cloth, and a large piece of *kundor*—a kind of gourd—being thrown into each hole.

Ceremonial bands of plaited coconut (?) leaves—called *jari lipan* (centipedes' feet) from their shape—to which were attached little square closed-in plaited boxes of the same material (*kētupat*) filled with rice, were then bound round each post in about the middle.

After an orthodox Mohamadan prayer had been said by a *Lēbai*, and incense burnt, the men who had come to help in erecting the house partook of a meal of glutinous rice dyed with turmeric (*pulut kunyet*), parched rice (*bērtis*), bananas, and *pulut* (*Oriza glutinosa*) wrapped in leaves, which was served to them on the recumbent posts. When they had finished eating, a man, who had been chosen by the *Pawang* as his assistant, brought water and poured it along each of the posts, walking clockwise round the house-site. After him came the *Pawang* with a sprinkler made of the leaves of several kinds of plants¹ in his right hand, and a brass bowl of ceremonial rice-flour mixed with water (*tēpong tawar*) in his left. He, having murmured a charm at the post from which he started, sprinkled the *tēpong tawar* along the posts, and into the holes which were to receive them.

After the *Pawang* had performed this rite the workmen gathered together to raise the first pair of posts with their connecting cross-bar, this being done with loud shouts of *Mohamad rasul' Allah*, the officiating *lēbai* reciting a prayer meanwhile. The rest of the posts were then similarly erected, and the ceremony was at an end.

On meeting the *Pawang* subsequently, I asked him to tell me the charm that he had said over the first post, when about to sprinkle it with *tēpong tawar*; and he gave me the two

¹ *Ribu ribu* (*Lygodium scandens*), *gandarusa* (*Justicia gandarusa*), *jēnyung* (?), and *sapuleh* (?).

following verses, which wish prosperity to the new house and its inhabitants:—

*Těpong tawar, těpong jati ;
Těpong awal mula mēnjadi.
Dapat mas bėrkati-kati,
Lagi hidup, sampai ka-mati.
Těpong tawar, těpong jati.
Surok batang mali-mali.
Sa-lengkar daun pėgaga.
Salamat ambil-lah galah.
Minta dayang sini.
Salamat puji bagi Allah.*

WHY THE BEAR HAS NO TAIL ¹

(A folk-tale of the Pahang Malays obtained near Kuala Krau.)

A very thin buffalo was once feeding in a meadow. To him came a tiger, and said, "I am going to eat you." The buffalo, however, besought the tiger to wait for seven days, "for," said he, "I am very thin, and if you wait for seven days, I shall have an opportunity of growing fat." To this the tiger agreed.

Now on the morning of the seventh day the buffalo was wandering disconsolately along, when a crippled monkey, who was sitting in a tree, called to him and asked him why he looked so sad. So the buffalo related how he had promised to meet a tiger, who wished to eat him.

"Very well, I will see if I can't help you," said the monkey, "but you must carry me on your back."

Thus they started in search of the tiger, with the monkey sitting on the buffalo's back; and before very long they met him.

Now as soon as the monkey saw the tiger, he began to munch two brinjals, which he had brought with him, exclaiming loudly as he did so, "My word, this tiger's head tastes good!"

The tiger, who heard what the monkey said, became frightened, and ran away as fast as he could. While he was still running, he came upon a bear, and told him about the monkey that ate tigers' heads.

Then he tried to persuade the bear to go and investigate the matter, but the bear replied that it was not his affair; still, if the tiger wished it, they would go together. Then, as each

¹ A variant of this story, translated by Mr. G. M. Laidlaw, in which the mouse-deer plays the parts of both the buffalo and the monkey, is to be found in the *J. R. A. S., S. B.*, No. 48, pp. 86-87.

was afraid that the other would run away, it was agreed that they should tie their tails together.

[At this time the bear had a fairly long tail, and the tiger's was shorter than it is now.]

So they tied their tails together and set out, and, after a little, they came to the place where the buffalo was waiting, and saw the monkey still crunching up the "tiger's head." Thereupon, being frightened, they both tried to escape, forgetting that their tails were tied together.

At length as they struggled one against the other, the bear's tail broke off short, and they both ran away.

The next time the tiger met the bear, he said, "Your loss is my gain; for you have lost your tail while mine has become longer."

And that is the reason why, to the present day, the bear has only a stump of a tail.

BUDAK YOID INTOIE.

*A folk-story obtained from the Sēnoi of the
Behrang Valley.*

[The Sakai who told me this story declared that it had been handed down among his people for generations. There seems to me, however, to be good reason for thinking that, at any rate, parts of it must have been adopted from the Malays, or, if the story is really old, from some fairly civilised people with whom the Sakai were in contact before the time of the invasion of the Peninsula by Malays. I. H. N. E.]

There was once a youth called Budak Yoid Intoie (Big Knife Youth) who was the youngest of seven brothers. His six elder brothers were famous smiths, and one day, when they had finished work, Budak Yoid Intoie asked them for some iron in order to try his hand, but his brothers refused to give him any. So he said to them, "How am I to learn, if you won't give me any iron?" Then he collected the odds and ends and scales of iron that they had left, beat them out into a huge knife as large as a *birah* leaf, and made a handle for it as large as the bole of a cocoanut-tree.

When it was finished he said to his father and mother and his brothers. "I am going on a journey." So he made ready, but before starting he planted a certain kind of flowering shrub, with a single blossom upon it, in the level space in front of the house, saying to his mother, and to his brothers, "See, O mother, see, you, my brothers, this shrub of mine! If the blossom on it withers entirely I shall be

dead, but if it shuts and then opens again, I shall still be alive."

Then he set out, taking his knife with him, and made his way through the jungle, cutting down as he went the big and small trees that stood in the path. And the sound of the great trees being cut and falling was, "*Prung punggau, prung punggau, prung punggau.*" Now a man who happened to be walking towards him, hearing the noise of the trees falling, and being frightened that one of them might kill him, began to call out, "*Ai! Ai! Ai!*, I am coming towards you and shall be struck by a tree!" "What is your name?" said Budak Yoid Intoie and the newcomer replied, "My name is Rah Serpik¹ (Pull-the-Canes)." Then answered Budak Yoid Intoie, "If your name is Pull-the-Canes, well, pull the canes!" So Rah Serpik pulled the canes out with one hand. "Well," said Budak Yoid Intoie, "if you can do that, you are rightly named Rah Serpik." So they stopped to chew betel-nut, and Rah Serpik asked his companion what his name was, to which he made reply, "Budak Yoid Intoie" (Big Knife Youth). "Why, if that is so," said Rah Serpik, "where's your knife?" "I don't know," said Budak Yoid Intoie, "I have not got it, it's only my name." Now he had hidden his knife in a large tree.

He, in his turn, asked Rah Serpik if he had a knife, and Rah Serpik replied, "If I carried a knife my name would not be Pull-the-Canes." Then he again asked Budak Yoid Intoie for a knife, as he wanted to cut up the betel-nut, and Budak Yoid Intoie said, "I have put it into the big tree over there. If you can lift it, I will become your follower. but, if you cannot, you shall become mine."

So Rah Serpik went to get the knife, but was unable to raise it, and Budak Yoid Intoie said, "Very well, you shall be my follower."

Then he got up and fetched it himself, and they chewed betel-nut, and, when they had finished, set out on their journey together, Rah Serpik following Budak Yoid Intoie, while Budak Yoid Intoie cut down the trees that stood in the way, *toalang*-trees, *kěmpas*-trees, *měrbau*-trees, *měranti*-trees, or whatever they were, "*Prung punggau, prung punggau, prung punggau.*"

Soon another man cried out from in front of them, "*Ai! Ai! Ai!*" just as Rah Serpik had done before. So Budak Yoid Intoie called the newcomer to him and asked him his name, and he replied, "Tinjau Tebik" (Thump-the-Banks)." Then said Budak Yoid Intoie, "Well, if your name is 'Thump-the-Banks,' just thump the banks of this river!" So Tinju Tebik² thumped the banks of the river with his fist, and they fell down and blocked the stream.

¹ *Kuntun manau* in Malay *Rotan manau* is a very useful kind of rattan-cane which is collected by the Sakai for sale to the Chinese

Then Tinju Tebikⁿ asked Budak Yoid Intoie his name and he told him. "If that is your name," said Tinju Tebikⁿ, "where is your knife?" "I don't know," replied Yoid Intoie.

So they sat down to chew betel-nut and Budak Yoid Intoie asked Tinju Tebikⁿ if he had a knife to cut the nut into pieces with, but Tinju Tebikⁿ answered, "If I had a knife, my name would not be Thump-the-Banks." After a little Tinju Tebikⁿ asked Budak Yoid Intoie if he had not got a knife and Budak Yoid Intoie told him where it was hidden, making him promise, just as he had done with Rah Serpik, to become his follower, if he could not lift it. But Tinju Tebikⁿ was not able to raise the knife any more than Rah Serpik, and Budak Yoid Intoie went and got it himself.

When they had finished chewing their betel-nut, they set out again, Budak Yoid Intoie being in front, with Rah Serpik and Tinju Tebikⁿ following him; and the sound of the trees being cut and falling before Budak Yoid Intoie was, "*Prung punggau, prung punggau, prung punggau.*"

After a little time someone cried out from in front as before, and again Budak Yoid Intoie called the newcomer to him. "What is your name?" said Budak Yoid Intoie, and the stranger replied, "Lingkong Benua (Push-the-Country-Round)." "Oh," said Budak Yoid Intoie, "if your name is Push-the-Country-Round, well, just push the country round!" So Lingkong Benua pushed the country round, till its backbone was broken; and Budak Yoid Intoie said to him, "Your name is rightly Lingkong Benua."

So they sat down to chew betel-nut and Lingkong Benua asked Budak Yoid Intoie for his knife, and was not able to lift it any more than Rah Serpik or Tinju Tebikⁿ had been able to do.

After a while they continued their journey, and at last they came to the sea and wished to cross it; and Budak Yoid Intoie said to his companions, "Wait here, while I go and search for a bridge." So he searched, but could not find any. Then he took his knife and said to it, "*Tohoit yang sah! Eng sindrang sah! Eng saihih! Eng putau! Eng nujum! Eng blian! Yoid eng jadi papat*," and the knife in its sheath became a bridge on which they could cross the sea. But a large dragon came up from below and waited under the bridge.

Then they went across, Budak Yoid Intoie's companions being in front of him; and when they came to the other side, Budak Yoid Intoie drew his knife from its sheath and cut off the dragon's head: and it floated away until it came to a Raja's bathing-place, and there it remained.

* I could not get a true translation of some of this charm "*Tohoit yang sah*" seems to be an invocation of some kind. *Eng sindrang* (I luck-bringing) *Eng nujum* (I astrologer). *Eng blian* (I were-tiger). *Yoid eng jadi papat* (Knife I become plank).

Now the Raja complained because the head was rotting and polluting the river, and ordered all his followers, from the mouth of the river to its source, to come together and remove the dragon's head; and they came together.

Meanwhile Budak Yoid Intoie and his companions went on their way until they came to a house, the owner of which was an old man named Tak Tempait Bungah (Grandfather Patterned Jar).

Tak Tempait Bungah asked them whence they came and they replied "from the neighbouring country." Then they climbed up into the house, which was situated up-stream from the Raja's palace, and there they stayed.

Now the Raja had given it out that whoever could remove the dragon's head should marry his daughter, who was shut in an upper room, and enclosed by a seven-fold fence of ivory; but nobody could do it, for the dragon's head was as big as a mountain.

One night Budak Yoid Intoie asked Tak Tempait Bungah what was the trouble from which the Raja wished to be set free, and Tak Tempait Bungah told him how the dragon's head had stranded at the Raja's bathing-place.

Some nights afterwards a follower of the Raja's came to the house, and Budak Yoid Intoie said in his hearing, "Why, if I only pushed the dragon's head with my finger, I could remove it."

When the Raja's follower got home, he told the Raja that he had met four men at Tak Tempait Bungah's house, one of whom said that he could remove the dragon's head with a finger. So the Raja ordered the four men to be called, and when the messenger told Budak Yoid Intoie the Raja's order, he said, "How can we go to the Raja's palace in these clothes, which are all covered with mud?"

The messenger returned to the Raja and told him what Budak Yoid Intoie had said; and he thereupon sent clothes and everything necessary to Budak Yoid Intoie.

So Budak Yoid Intoie set out, leaving his companions behind him, and, when he arrived at the palace, the Raja gave him food and betel-nut.

When he had fed, the Raja asked him from where he came, and he replied that he came from the country across the sea, and asked why he had been sent for. Thereupon the Raja told Budak Yoid Intoie how he had heard that he (Budak Yoid Intoie) could remove the dragon's head with one finger, and promised him, that, if he could do so, he should have his daughter in marriage.

Now Budak Yoid Intoie went alone to the river to see the dragon's head, and gave it a slight push, which sent it floating

down stream; then he returned to the house where he was staying, without the Raja knowing about it.

After a time some of the Raja's people came down to the river and found that the dragon's head was gone; and, when the Raja was informed of this, he called Budak Yoid Intoie to his palace and wished to give his daughter to him in marriage; but Budak Yoid Intoie excused himself, saying that he wished to travel more and see other countries before he married. So Budak Yoid Intoie gave the Raja's daughter to Rah Serpik as wife.

Now the Raja's daughter was betrothed to Bonsu Jangkah Benua,¹ the son of another Raja, and was to have married him in three months.

One day Bonsu Jangkah Benua drew his sword, the blade of which was as large as a banana leaf, and the hilt like the bole of a coconut-tree, and said, "Why, the rust on my sword-blade is like a "male" ants'-nest"; perhaps someone has married my betrothed."

Then he got ready his ship, loaded it with weapons of all kinds, and set sail.

When the Raja saw Bonsu Jangkah Benua's ship approaching he thought to himself, "Perhaps this is my daughter's betrothed." And Budak Yoid Intoie and his four companions were in the palace at the time.

As soon as the ship came to land Bonsu Jangkah Benua went straight to the Raja's palace and called from below the steps, "Whoever has taken my betrothed, come down!"

Now when the Raja had heard the music of the gongs and the flutes coming from Bonsu Jangkah Benua's ship, as it approached, and the noise of the cannon being fired, he had run away into an inner room and had hidden his head in a single-ended drum.

Budak Yoid Intoie heard Bonsu Jangkah Benua below the steps and he called to him to come up into the palace to chew betel-nut, acknowledging that there had been a fault in the matter of the princess marrying. But Bonsu Jangkah Benua refused to chew betel-nut with him, and said that he would cut in two the man who had stolen his betrothed.

Then Budak Yoid Intoie took a censer and burnt incense, saying, "Chiloh tuk pedak" eng mar s'lah
 come down ancestor sword I size leaf
 bah."
 rice

Whereupon the sword came down from the sky and it was of the size of a rice-leaf. And he told Bonsu Jangkah Benua to return to his ship, but he refused.

¹ Youngest-Son-Strides-Over-Country (?).

² Tall and pointed nests of the termite are called male nests

So Budak Yoid Intoie came down from the house, and when he had reached the lowest step Bonsu Jangkah Benua aimed a blow at him with his sword; but Budak Yoid Intoie leapt aside, and Jangkah Benua's sword cut the step in two. Thus they fought, but Budak Yoid Intoie did not attack and avoided the blows of Jangkah Benua's sword; when he smote low, jumping high; when he smote high, bending low.

At last Budak Yoid Intoie leant against a tree, and Jangkah Benua stabbed at him and broke his sword in the tree as Budak Yoid Intoie jumped aside. Next he took a *këris*, and that also broke against a tree; and then in turn a *sundang*, a *lumang*, a *tumbok lada*, a *golok*, a *badek*¹, and a gun, but each in turn became useless.

Then he took a cannon and fired at Budak Yoid Intoie for seven days and seven nights, so that the village and everything in it was destroyed.

After this Bonsu Jangkah Benua had no more weapons left, and the fight stopped, Budak Yoid Intoie up till this time having made no attack.

Then Budak Yoid Intoie began to dance the war dance (Malay, *gayong*), and made a feint at Jangkah Benua; but the latter taunted him, asking him how he expected to kill a man with a sword the size of a rice-leaf. Again Budak Yoid Intoie made a feint at Jangkah Benua, and again Jangkah Benua taunted him. Then said Budak Yoid Intoie, "I have made two feints at you, if I make another just see if you don't remember it!" and he made another feint at him from far off. But Jangkah Benua continued to jeer at him, saying, "You fool, how can you expect to reach me with your sword from such a distance!" "If you don't believe that I have touched you," said Budak Yoid Intoie, "just bow your head," and on Jangkah Benua's doing so, his head fell off, and he died.

Then Budak Yoid Intoie collected all Jangkah Benua's weapons, and those which were bent became straight, and those which were broken became whole.

Next he brought Jangkah Benua to life again, and gave him back his weapons, and sent him away in his ship.

[Budak Yoid Intoie then goes through exactly similar adventures at the courts of two other Rajas to whose bathing-places the dragon's head drifts, and marries his two remaining followers to their daughters; just as he married Rah Seipik to that of the first Raja.]

¹ Different kinds of swords, knives, and daggers.

Now after the last of his three followers (Lingkong Benua) had been married, Budak Yoid Intoie planted a shrub, bearing a single blossom, in the open space in front of each of their houses, just as he had done in front of his father's house before he set out on his journey; and, telling them that he wished to travel again, explained how, if he died, the flowers would wither.

Then he set out towards the open sea, and at last he came to a city called Bandar Benua, which lay close to the shore: but he found no people dwelling there; not even any animals.

At length he came to the Raja's palace and, going up into it he called aloud three times, but nobody answered him.

So he searched the house and at last he came across a single-ended drum, and, on his sitting down to beat it, heard someone calling from inside it. Then the person in the drum came out, and he found that it was a beautiful princess: and she told him how the country had been laid waste by an enormous twice seven-headed Roc¹ which came every evening from the *Pauh Janggi*,² that grew on the shore near the palace.

Then the princess gave him food, but towards evening she hid herself in the drum again, and Budak Yoid Intoie went out on to a platform in front of the palace and burnt incense, calling to his ancestor to let down his sword from the sky, for it had vanished after each of the fights with the three Rajas' sons. Upon this the sword came down to him, and it was not long before the Roc came and perched on the *Pauh Janggi*; and every head croaked, "*Laur! Laur! Laur!*"

Then Budak Yoid Intoie cut off the heads of the Roc, till only one remained, and when he cut off this as well, the Roc fell forward, dead, pinning him under one of its wings.

Now at about this time Budak Yoid Intoie's followers observed that the flowers on the shrubs that he had planted, had withered. So they set out to search for him, and at last they came to Bandar Benua, and there they met the princess, who told them how Budak Yoid Intoie had been pinned beneath the Roc for seven days and seven nights. Then they cut away the Roc's body and released him.

So Budak Yoid Intoie married the princess and lived at Bandar Benua, but his companions returned to their homes.

NOTES ON MALAY BELIEFS AND CUSTOMS (II).

If you go to bed with a grain of rice sticking to your clothes or your body, you will dream that a tiger is hunting you. (From a Malay of Kampong Linggi, Negri Sembilan).

¹ The Sakai name for this bird is *Panger*; the Malay name *Garuda*.

² The *Pauh Janggi*: a tree believed by the Malays to grow on a sunken bank in the centre of the ocean (Wilkinson's Dictionary).

Filings from a porcupine's tooth, if drunk in water, are a remedy for poison taken internally. (From a Malay of Kuala Krau, Pahang).

When women go down to the river to get water for use in *bêrhantu* ceremonies (spiritualistic *séances*) held for the benefit of sick persons, they must not speak to anyone while carrying it. Furthermore, they must cover the mouths of the vessels with leaves when full, and, in filling them, must let the water trickle in slowly, and not allow it to enter with a gurgling sound. (From a Malay of Pulau Tawar, Pahang. My informant, seeing a woman on the banks of the Pahang River carrying up a water-pot whose mouth was covered with leaves, gave me this note).

If you are afraid that some mischance will befall you because you have left your village without satisfying a craving for tobacco or food,¹ put the third finger of your right hand into your mouth, and suck it three or four times. You will thus avert misfortune. (From a Malay of Pulau Tawar, Pahang).

There is a deep, round depression near the Pahang River not far from Jerantut, but on the opposite bank, which is called Leboh Chupak. It is said that a village once stood on this site, but was overwhelmed by a storm, and swallowed up by subsidence of the ground, because a man placed two half coconut-shells—*chupak* measures—like caps on the head of a dog and a cat, and laughed at them in company with other villagers.² (From a Malay of Pulau Tawar, Pahang).

To bring rain the cooking-pots and their cane stands must be washed, and a cat given a bath³. (From a Malay of Kampong Linggi, Negri Sembilan).

Scrapings of an incisor tooth of a bamboo-rat if applied to wounds in the feet caused by bamboo-stumps will effect a speedy cure (From a Malay of Kampong Perak, near Batu Kurau, Perak).

Wood must not be chopped on the threshold of a house, or the owner will be bitten by a snake or centipede when he goes to the jungle. (From a Malay of Kampong Perak, Batu Kurau, Perak, whom I heard rebuking his wife for thus chopping firewood).

Nobody should lie with legs sprawled out of a doorway, or a tiger will come to the village. (From the same Malay as

¹ *Iakut kèna hēmpunan.*

² I have obtained stories of the dreadful fate which overtakes those who dress up animals and laugh at them, from Sakai in several districts, but this is the first time that I have heard of such a belief among the Malays. The word used in the neighbourhood of Pulau Tawar for a bad storm followed by a subsidence of the ground is *kèliboh*, *lèboh* seemingly being the name given to places where such subsidence is thought to have occurred. *Chilaw*, a term frequently used by Sakai (when speaking Malay) to describe these storms caused by impious actions, has a very similar meaning. *Leboh* is a local variant of the ordinary Malay word *lebor*, which means "smelting," "liquefaction," or "destruction."

³ *Mandikan pèrioh, mandikan lèkar, mandikan kuching*

the above, who had occasion to rebuke his wife, in my hearing, for breaking this tabu also).

If the owner of a gun constantly uses it for shooting big game, he should not keep, or place it, in a leaning position; otherwise animals that he shoots, if mortally wounded, will not fall dead for some time. (From the same Malay as the above).

BĒLA KAMPONG.

Bela kampung is an annual ceremony which is performed by the Malays of the Endau—and, I believe, in other parts of the country as well—in order to avert misfortune and disease. It is difficult to give a suitable translation of the name for these rites, and the nearest approach that I can make is “cherishing the village.” They are purely pagan and, as such, are frowned upon by the more orthodox Malays.

While I was stopping in Kampong Pianggu on the Endau River in August of this year (1917), a *bela kampung*, which was about to be held, was postponed owing to the presence of three Dyaks, who were with me. These men were engaged in shooting birds and mammals and in collecting insects and botanical specimens, such actions being tabu while the ceremony is in progress.

The Dyaks having left me temporarily, I asked the *Pawang* to perform the rites while I was in the village, and before my men should return from up-stream. This, however, appeared to be impossible, as he each day made some excuse—that there was a wedding on, or that someone had died and that it was tabu to hold the *bĒla kampung* in consequence. As I had already made arrangements for leaving the Endau, I was unable to postpone my departure until the *Pawang* should fix upon an auspicious day; nevertheless, by dint of questioning him, and others, I got some information which is, perhaps, worth placing on record.

According to old custom while the *bĒla kampung* is being performed, the village is laid under a three days' tabu by the *Pawang*, and during this period strangers must not enter it, nor may any of the inhabitants shoot animals, gather cocoanuts, *sireh*, or banana leaves; leave the village; dig their land; use abusive language; or make a loud noise (*e.g.* beat gongs as at a wedding).

The day chosen for the beginning of the rites depends partly on the *Pawang's* dreams. Should he have fixed a day, he will put it off if he has an unlucky dream during the night before—that he is being chased by a tiger, for instance, or that somebody is angry with him; but will hold it if his dreams are lucky (*e.g.* that he has been given many presents).

When a village is under tabu white rags are tied to cords at the bathing-places (*jamhan*), if the settlement is on the main

river ; but, if it is on a small side-stream, a cord, from which rags are suspended, is frequently stretched from bank to bank.

Nowadays only a one day's *bēla kampong* is allowed at Pianggu and the prohibitions with regard to persons arriving at, or leaving, the village are no longer in force.

It appears that *bēla kampong* on the Endau is performed rather with a view to keeping the local spirits of the soil in a good temper, and gaining their aid against invading evil, than with a view to banishing troublesome and evilly disposed supernatural beings, a not uncommon practice in many parts of the Malayan region, and one which is resorted to on the Endau if epidemic disease appears, when the villages are placed under a seven days' tabu, and spirit-ships launched. These are supposed to carry away the *hantu* (spirits) which are causing the trouble.

I mentioned the custom of the yearly purification of villages by means of spirit-boats to the *Pawang* of Pianggu and he said, "*Lain pawang, lain adat*" (other *Pawang*s, other customs).

I obtained very few details with regard to the ceremony proper, but it appears that the *Pawang* makes a round of the village, collecting small offerings of food from each householder, and that towards evening on the third day he places, or hangs, these in the jungle, asking the spirits to accept the presents made to them, and to protect the village throughout the ensuing year.

XXIV. NOTES ON THE GENUS *PETAURISTA*,
Pall., WITH DESCRIPTIONS OF TWO
NEW RACES.

By H. C. ROBINSON, C.M.Z.S. AND C. B. KLOSS, F.Z.S.

The form of *Petaurista petaurista* inhabiting the mountains of the extreme east of Java is separable at a glance from that found in the western end of the island and in the absence of citation of the typical locality we have selected the Preanger Regencies as the habitat of the typical form. The eastern race may be described as:—

PETAURISTA PETAURISTA NIGRICAUDATUS, subsp. nov.

Type:—Adult male with slightly worn teeth (skin and skull), collected at Ongop Ongop, Idjen Massif, 5,700 feet, near Banjoe-wangi, East Java, on April 9th, 1916, by Federated Malay States Museums Collector, F.M.S. Mus. No. 323/16.

Characters:—Differing from all other forms of the *petaurista* (*nitidus*) section in having the general colour of the tail black, the sub-basal portions of the hairs ferruginous maroon; ears dark chestnut, black orbital ring extensive, feet and hands black, this colour more extensive than in other forms and extending along the margin of the uropatagium.

Colour:—Above glistening chestnut maroon, duller and less maroon than in the West Javan form (*P. petaurista*), head and sides of the face more bay. All the hairs of the upper surface with black tips, most pronounced along the median line; nose, chin, a broad orbital ring and the vibrissae, black. Hands and feet black, with little or no chestnut on the metapodials, margin of the antibrachial and interfemoral membranes black, parachute ochraceous salmon, more rufous on edge, lower surface similar. Ears dull brown, the hairs at the base tipped with black, thinly clad with short black hairs on the interior of the basal part of the conch, mixed with brownish chestnut at the tips. Tail glossy black above, the bases of the hairs grey, the median area clouded with maroon, this colour being more noticeable beneath; tip not noticeably blacker.

Skull:—Does not apparently differ from that of *P. p. melanotus* from the Malay Peninsula; teeth slightly larger.

Measurements of the type:—Head and body, 436 (400¹); tail, 462 (534); hindfoot, 74 (76); ear, 41 mm., taken in the flesh by native collector.

1. Measurements in parenthesis are those of an adult male. *P. p. melanotus* from Lay Song Hong, Trang, Siamese Malay, States, F.M.S. Mus. No. 1226/10.

Cranial measurements: greatest length, 70.9 (72.0); condylo-basilar length, 64.0 (62.0); palatilar length, 32.9 (32.5); diastema, 15.0 (14.7); upper molar row, including pm^3 16.9 (16.5); interorbital breadth, 15.7 (15.3); postorbital breadth, 18.1 (18.4); zygomatic breadth, 48.7 (48.2); length of nasals, 22.4 (22.7); breadth of combined nasals, 13.3 (13.0) mm.

For detailed measurements of the series see p. 226.

Specimens examined:— Six, three from the type locality and three from Sodong Jerok, 3,900 feet, also on the Idjen Massif.

The series obtained are all very uniform and differ very markedly from that from Tjibodas, West Java, which we have assumed to be the typical race in brighter general colouration, the general hue being more brownish in the Tjibodas skin, with the feet dark brown, not pure black, and the orbital ring narrow. The greatest difference however, is in the tail, which is ferruginous bay with a terminal black tip in the western animal as in all others of the group which we have been able to examine, though it should be noted that Hose¹ describes a specimen, presumably from Borneo, which appears to agree closely with the above form, though other authorities specifically state that the tail of the Bornean race is rufous or ferruginous with a black tip.

The Penang race, on examination of a considerable series, differs sufficiently from that inhabiting the mainland to receive a name:—

PETAURISTA PETAURISTA PENANGENSIS, subsp. nov.

Type:—Adult female (skin and skull), collected at Telok Bahang, Penang Island, on 27th March, 1911 by E. Seimund. Federated Malay States Museum No. 1413/11. Original number 4211.

Diagnosis. External characters precisely as in *P. p. melanotus* from the south of the Malay Peninsula but size smaller and rostrum shorter and relatively broader.

Dimensions. See table on page 226.

Specimens examined. Three, all from the type locality.

PETAURISTA PETAURISTA TERUTAUS, Lyon.

Petaurista terutaus, Lyon, Proc. Biol. Soc. Washington, xx, p. 17 (1907).

This race was described by Mr. Lyon from a single specimen collected by Dr. W. L. Abbott in 1904.

Though the island has been visited by us on several occasions we never succeeded in obtaining specimens until December 1916. In that month, however, considerable wood cutting was going on in the island opening up vistas in jungle and we were so fortunate as to obtain three adults.

¹ Hose, Mammals of Borneo, p. 41 (1893)

These agree well with the original diagnosis and show that the race is very distinct from the mainland form and seeing that the original account was based on the unique type only it may be well to give a description of our series.

General colour much browner and less rufous than *P. p. melanotus* (type locality here designated as Selangor), the hairs on the middle of the sides with buff tips giving the effect of a pale elliptical patch. Limbs chestnut brown, becoming black on the metapodials and digits. Head varying from greyish buff to cinnamon buff. Parachute like the back or the limbs; uropatagium edged with black, edges of parachute buffy grey; tail like the back, extensively blackened distally but the dark colour not sharply margined, bases of the hairs throughout black, the base of the tail also washed with black. Muzzle, chin and eye ring black, ears with proectote ochraceous, metectote extensively black. Undersurface, pale salmon orange, foreneck whitish, inner sides of limbs blackish brown.

Specimens examined:—Three (1 ♂, 2 ♀) from Telok Wau (Wanderer Bay), East side of Pulau Terutau, Straits of Malacca.

Dimensions:—See table on page 226.

MEASUREMENTS OF FOUR FORMS OF *Petaurista petaurista* (PALL.)

| Locality | Sex | Body | | Skull | | | | | | | | | | F M S Mus No | Condition of teeth | REMARKS |
|---|-----|---------------|------|----------|--------------|--------------------------|-----------------------|----------|-----------------|----------------------|---------------------|-------------------|---------------------------|---------------------|-----------------------|---------|
| | | Head and Body | Tail | Hindfoot | Total length | (ondylo basilar | Palatal | Diastema | Upper molar row | Interorbital breadth | Postorbital breadth | Zygomatic breadth | Length of nasals | | | |
| <i>Petaurista petaurista nigricaudatus.</i> | | | | | | | | | | | | | | | | |
| Sudong Jerok, 3,900 feet | ♂ | 435 | 464 | 70 | 702 62 | 31 2 14 4 16 | 17 | 18 | 148 8 21 8 13 | Worn | 320/16 | Adult | N C M Type of sub-species | | | |
| Banjoewangi, E Java | ♂ | 425 | 485 | 75 | 722 63 | 32 3 15 16 8 16 | 2 16 8 47 2 22 12 9 | MI" worn | 321/16 | 322/16 | 323/16 | 324/16 | 325/16 | Teeth fully up worn | N C M | |
| " | ♂ | 405 | 464 | 72 | 688 62 | 32 14 17 15 9 19 | 7 48 21 12 9 | MI" worn | 321/16 | 322/16 | 323/16 | 324/16 | 325/16 | Teeth fully up worn | N C M | |
| Ongop Ongop, 5,700 feet | ♂ | 436 | 462 | 72 | 709 64 | 32 9 15 16 9 15 | 7 18 1 48 7 22 4 13 3 | Worn | 321/16 | 322/16 | 323/16 | 324/16 | 325/16 | Teeth fully up worn | N C M | |
| " 5,700 " | ♂ | 415 | 436 | 67 | 682 60 | 31 1 13 8 17 1 14 6 17 | 48 3 20 3 13 | MI worn | 321/16 | 322/16 | 323/16 | 324/16 | 325/16 | Teeth fully up worn | N C M | |
| " 5,700 " | ♀ | 424 | 446 | 74 | 708 63 | 1 33 15 15 9 15 | 17 49 2 21 3 13 | Worn | 321/16 | 322/16 | 323/16 | 324/16 | 325/16 | Teeth fully up worn | N C M | |
| <i>Petaurista petaurista petaurista.</i> | | | | | | | | | | | | | | | | |
| Tubodas, W Java, 4,500 ft | ♀ | 415 | 503 | 73 | 732 | 33 2 14 8 17 2 15 5 16 4 | 19 8 12 8 | Unworn | 189/16 | 190/16 | 191/16 | 192/16 | 193/16 | Teeth fully up worn | N C M | |
| <i>Petaurista petaurista penangensis.</i> | | | | | | | | | | | | | | | | |
| Telok Bahang, Penang Id | ♀ | 398 | 492 | 72 | 6758 | 4 30 2 13 6 16 | 15 15 6 4 3 19 1 13 | SI worn | 1413/11 | 1423/11 | 1433/11 | 1443/11 | 1453/11 | Type | N C M | |
| " | ♀ | 408 | 405 | 74 | 6859 | 1 30 13 5 16 3 15 | 18 40 19 4 12 9 | Worn | 1413/11 | 1423/11 | 1433/11 | 1443/11 | 1453/11 | Type | N C M | |
| " | ♂ | 363 | 442 | 66 | 64456 | 29 12 6 15 1 13 18 7 44 | 18 3 11 8 | Unworn | 1413/11 | 1423/11 | 1433/11 | 1443/11 | 1453/11 | Type | N C M | |
| <i>Petaurista petaurista terutensis.</i> | | | | | | | | | | | | | | | | |
| Terutan Id. | ♀ | 385 | 452 | 67 | 65358 | 3 30 2 13 9 14 8 11 8 15 | 42 7 21 11 9 | SI worn | 170/17 | 171/17 | 172/17 | 173/17 | 174/17 | Type | N C M | |
| " | ♀ | 372 | 460 | 67 | 65256 | 30 2 13 3 14 8 12 3 15 | 7 42 2 19 9 10 8 | Unworn | 170/17 | 171/17 | 172/17 | 173/17 | 174/17 | Type | N C M | |
| " | ♂ | 391 | 408 | 65 | 65156 | 29 1 14 12 9 16 | 44 1 20 1 10 9 | MI worn | 170/17 | 171/17 | 172/17 | 173/17 | 174/17 | Type | N C M | |
| " | ♂ | 385 | 450 | 66 | 64357 | .. 14 2 12 4 16 6 44 3 | .. | .. | 170/17 | 171/17 | 172/17 | 173/17 | 174/17 | Type | N C M | |

N C M — Native collectors external measurements

XXV. PRELIMINARY REPORT ON CAVE EXPLORATION, NEAR LENGGONG, UPPER PERAK.

By IVOR H. N. EVANS, B.A.

Early in 1917 I visited Lenggong, in Upper Perak, with a view to excavating certain of the caves and rock-shelters, which are common in the neighbourhood of that place. Some exploration of such sites had already been conducted by Mr. L. Wray, then Curator of the Perak Museum, in the years 1886, 1891, and at some later date (not stated), the caves that he dealt with being situated in Gunong Cheroh, near Ipoh. His finds, though sufficiently interesting, did not throw any great amount of light on the question of the early inhabitants of the Peninsula. To sum up his work, he proved that some of the rock-shelters and caves of the Peninsula were formerly occupied, for a considerable time, by a people who lived largely on the flesh of wild animals (and broke their bones to obtain the marrow), while they consumed quantities of fluviatile mollusks; who used mealing stones and red haematite paint; and were, in some manner, able to possess themselves of a few valves of a species of marine shell (*Cyrena sumatrensis*).

A stone celt, that is a natural stone of convenient shape ground to a sharp edge, was discovered during the later excavations at a depth of two feet. Mr. Wray concluded from the finding of this specimen that the people who inhabited the caves were not necessarily the makers of stone implements, "but only that they were contemporaneous with the makers of the implements, from whom they sometimes obtained one by barter or otherwise, in the same way as the modern Sakai get iron axes and chopping-knives from the Malays." This may, of course, have been so; but, if the makers of the stone implements preceded the inhabitants of the caves (a point which his excavations did not prove), a cave-dweller may have met with the aforesaid implement lying on the surface of the soil and have taken it home with him, just as the Malays do with these lithic relics at the present time.

On the day after my arrival at Lenggong, I visited the Gua Kajang, a natural tunnel which pierces a limestone hill. A path leading from near Lenggong to Kampong Gelok passes through it. At the entrance facing Kampong Gelok there are two large bays, one on either side of the cave-mouth. These are rock-shelters of just the type which were, and are, usually favoured by cave-dwellers. I made an inspection of the floor of the shelter on the left, which was the deeper of the two, and found a large number of the shells of fluviatile mollusks (belonging to the genus *Melania*) in a hollow worn in it

by the continual dropping of water from the point of a large stalactite. I therefore decided that these bays would probably be well worth excavating.

I may remark here that the rock-shelters in the neighbourhood of Lenggong are frequently visited, and sometimes occupied for short periods, by the Negrito tribesmen who frequent the locality. The two mentioned above, and others which I examined later, showed traces of having been recently used, among the remains left behind by the Negritos being bamboo sleeping-platforms, sections of blow-pipes, burnt-out fires, and the bones of soft turtles, bats and flying-foxes, which had been roasted and consumed on the spot. The walls of the Gua Kajang and the two bays were covered with the names of Malay visitors written in Arabic or Roman character, while Chinese too had inscribed their signatures in their native ideographs. On the walls of the left-hand bay, however, I found some patterns, drawn with charcoal, which were obviously the work of Negritos, since they were exactly similar to those which they engrave on their dart-quivers. Some other very rude drawings should also, probably, be attributed to these people. One of them, seemingly of an elephant drawing a four-wheeled waggon, had points of interest; for the artist, wishing to depict a vehicle of this kind, but either being unable to visualise it as it would appear when viewed from the side, or not being skilful enough to depict the parts of the off-side wheels which would be seen, had sketched the two near wheels and then added another couple, which were not attached to the waggon at all, one being placed in front of it, and the other behind.

I came into contact with the Negritos on two occasions, and once employed two men of the tribe to assist me in digging. I was thus able to get them to talk to me about their habit of using the caves, and to hear what they had to say with regard to the specimens found. On their visiting me at Lenggong Rest-House I also showed them three polished stone implements which I had purchased from Malays, who had found them in the surface-soil of land planted with rice or rubber. The Negritos called these *batu karch*, "thunder stones," which is practically equivalent to the Malay name for them (*halilintar* or *batu lintar*). I do not think that they have any traditions of their ancestors using anything of the kind.

Having determined to excavate the left-hand bay, I started work with a few coolies. I first of all had small trial pits sunk here and there in the cave floor with the object of gaining some idea of the nature of the deposits and of their thickness. In every pit fragments of bones and spiral fresh-water shells were found in quantities. At the further end of the cave the deposit proved to be only a few inches in depth, but towards the mouth it was over four feet thick. About the middle, at a depth of two feet, a hard stratum of shells and broken bits of bone cemented together with lime was encountered, with about another foot of

loose shell, bone, and earth deposit lying below it. Beneath this was the limestone rock of the hill in which the cave is situated. For the next few days, after opening these pits, we were engaged in excavating a block of the cave floor to a length of thirty-one feet and a breadth of about eight feet, the excavation being carried down to the solid rock. We were rewarded by the discovery, with which I will later deal in detail, of large quantities of the spiral shells mentioned above; numbers of fragments of bone, chiefly mammalian, some pieces of red iron oxide, similar to those found by Mr. Wray at Gunong Cheroh¹; a round water-worn stone, probably used for grinding; a mealing-slab; some pottery; parts of a human skeleton; a chipped stone implement of primitive type, and a rather doubtful implement of red stone.

The floor of the cave consisted of a mass of shells and bones mixed with earth and lime, the latter, however, not being usually present in sufficient quantity, or never having been moist enough, to bind the deposit together. The bones found were mostly in a fragmentary condition, having seemingly been pounded to bits in order to extract the marrow. Many of the fragments were blackened, or browned, by burning, and some, from the hard layer mentioned above, were much mineralized. No marks of gnawing were to be observed on any of them, so it would seem likely that the cave-dwellers did not keep dogs. No bone implements of any kind were found, and only one small piece which shewed signs of having been cut with a sharp instrument. Remains of the following animals were detected—deer (*Cervus unicolor*), muntjac, squirrel, rhinoceros, bamboo-rat and wild-pig.

The molluscan shells belonged to the genera *Unio* and *Melania*. The former were rare, the latter abundant, while a peculiar feature was that in every case the topmost whorls of the spiral shells had been broken off,² evidently for the purpose of facilitating the extraction of their contents. The Patani Malays of Upper Perak search for these mollusks for food,³ but they told me that the Negritos did not do so, this information being subsequently confirmed by several men of the local tribe, particularly by the two whom I employed in digging. Furthermore, no such shells were found among the animal and other recent remains which the Negritos had left in the caves, nor do I remember ever having seen them lying about in their encampments.

I have already mentioned that a mealing-slab, very similar to those obtained by Mr. Wray, was discovered in the cave. This was turned up at a depth of about two feet from

¹ These are in the Perak Museum.

² Mr. Wray notes that the shells of *Melania* found in the cave excavated by him had been similarly treated

³ The Malay boil the mollusks and suck them out of their shells. The top whorls of the shells are knocked off before boiling, in order to render their contents easy to extract.

the surface in the lime-cemented layer of shell and bone deposit. It is a block of limestone, hollowed out on one surface by constant use.

The hard layer of deposit proved to be the richest in interesting objects and, in addition to the grinding slab, there were discovered in it the mealing or grinding-stone, the human remains, and the stone implement already mentioned.

The mealing-stone, a circular water-rounded granite pebble, is stained with the red pigment referred to above. Other water-worn stones, mostly of quartz, were found in fair numbers, all having evidently been brought home by the cave-dwellers with the intention of making use of them.

Some of these also were stained with pigment, having been probably used for grinding it up.

The stone implement was found in a small trial pit, sunk previous to general excavation. I shall, however, describe this specimen later, when dealing with similar objects obtained in the course of excavating the other bay at the mouth of the Gua Kajang. The human remains were, rather unfortunately, first discovered by one of my Malays. This man, being tired with digging, had left the spot at which we were working, and had started scratching and burrowing in the trial pit just mentioned. When he had been thus employed for some time, he brought me a fragment of human jaw with some teeth still in it, saying that he had found a good many other pieces of bone and had thrown them out of the hole. I, therefore, set to work to collect as many of the broken bits as possible and to excavate some pieces of jaw which were visible in the burrow that he had made. There were thus retrieved the greater portions of an upper and a lower jaw, but only one small portion of the skull, some fragments of ribs, and some finger-bones. When the surrounding ground, which formed part of the block that I had decided to open, was properly excavated, some arm, leg, foot, and other bones were also discovered; these were removed, as far as was possible, imbedded in lime and shell matrix. A very large part of the skeleton was missing, and our efforts to find the rest of it were not successful.

These bones have not yet been cleaned or reported upon by an expert, so I do not feel justified in making more than a few remarks anent them. Judging by the teeth, they are those of an aged person, the worn-down state of the molars being remarkable.¹ The front teeth appear to have been filed down to a certain extent, a practice still indulged in by the Malays and some of the Negrito tribes. I could see no signs of the earth above the body having been disturbed since its first deposition. The bones were, as already stated, imbedded in a matrix of shells and fragments of bones, were hard, though

¹ This is also a noticeable characteristic of some of the human teeth found by Mr Wray

brittle, and seemingly much impregnated with lime from the stratum in which they lay. I am inclined to think, therefore, that the skeleton was contemporaneous with the deposit in which it was found. Since the skeleton was incomplete, we must suppose that the body was partly destroyed¹ after death.

The pottery, mentioned above, I shall also treat of in connexion with the finds made in our second set of excavations, carried out, as I have observed, in the other bay at the Gelok entrance to the Gua Kajang. This was considerably smaller than that which we opened first,² having a length of forty feet and a breadth of twenty, and being subtended by only two walls. The time at my disposal was not sufficient to allow of the whole of the site being explored and I contented myself with opening two square pits (each 5 feet by 5 feet), in the same line, but separated by a band of earth four and a half feet wide. In these we found that the shell and bone deposit extended to a depth of about three feet, with several inches of mixed clay and sand lying below. The two pits were dug at about a distance of two feet from the side-wall of the bay, and the measurement from the end wall to the nearest edge of the innermost of the two was five feet six inches. In one of these excavations a rough stone implement was found at just over a foot from the surface, and several flakes and a core at depths ranging from one to two feet. Fragments of pottery were also present in small quantities—chiefly in the more superficial layers, but one or two pieces were found at a depth of nearly two feet.

To turn now to the subject of manufactured stone implements and flakes found in the course of our explorations.

In both sets of excavations a large number of pebbles were met with, which were obviously not local: many of them were of quartz, others of some dark, fine-grained metamorphic rock, or of red chert (?). These must evidently have been brought home by the cave-dwellers either for use in their natural state, or for the purpose of making implements.

Now the flakes, nearly all of which have well developed bulbs of percussion, must, I think, owing to the situation in which they were found, be allowed to be made by man. They have not yet been examined by a geologist with a view to determining their materials, but the following rocks seem to be represented—red chert (one flake); limestone (one flake); reddish-yellow chert (?) (two flakes); yellow chert (?) (one flake); black metamorphic rock (two flakes); a fine-grained ochre-coloured stone (one flake); stalactite (one flake). In addition numerous fragments of pebbles of various kinds were found, which do not exhibit definite signs of working. The core shews clear traces of at least eleven flakes having been

¹ Perhaps by porcupines. The body may not have been buried at all, but merely left lying in the cave.

² The first bay was a small cave seventy-six feet long with a minimum breadth of about ten feet.

removed from it. Its material is a black and very fine-grained rock, something like black flint in appearance. It seems to have been easy to work, the channels left by the removal of flakes being smooth, and the ridges between them sharply defined. Thin edges of the rock are slightly translucent.

With regard to the two stone implements and to a few rather doubtful specimens.

One implement, a broadly lanceolate object, that which was found near the human remains, is roughly chipped out of a piece of granite; a large part of the upper side being the original smooth and weathered, or water-worn, skin of the rock. This is yellowish in colour. The stone has been trimmed to shape by blows delivered on the under edge, the flakes thus splitting from the upper surface. Granite is not particularly suitable for working, being of too coarse a grain, and the flaking is therefore rough. Some trimming of a similar kind is observable round the edges of the lower surface, but is not so well marked as above. A patch in the centre of this side is also stained yellow and appears to be the natural skin of the stone, but is rougher than that on the upper surface.

The other well marked implement is very similar in outline to that just described, but the under surface is flattish, while the upper is turtle-backed. The material from which it is made is a hard and fine-grained black rock, probably metamorphic. An island of the original greyish skin of the pebble is left on the centre of its upper face and forms its highest part. Chipping extends from the edge to the margin of this island. The flakes removed from the under surface were evidently much larger than those from the upper. The rock, though fine-grained, does not seem to have been easy to work.

We now come to two other specimens which are not so well defined. One of these has been extensively chipped at the edge till the "front" of it is almost semi-circular. The material of this slab is a fine-grained stone of a dark purple-red colour about seven-tenths of an inch in thickness, which has both faces worn smooth by river action. An edge has been broken away, but whether previous to chipping or not, I cannot say for certain. The other specimen appears to have been intended for an implement of similar outline to the first two described and is probably in an unfinished state. Its material is a dark, fine-grained stone and a portion of the original water-worn skin remains on either face. Chipping is fairly extensive, especially on the upper surface towards the point. Below, flakes have also been removed in numbers, but they do not reach so far towards the middle.

About two other objects I am very doubtful. They shew no obvious signs of chipping, and none of grinding,

yet their shape is peculiar, and their material—a black, fine-grained rock, seemingly similar to that of the last-described specimen—is not, as far as I know, found in the neighbourhood of the caves. It seems probable, therefore, that the two stones were brought to the cave by its inhabitants. The first, did it shew signs of chipping or of polishing, might from its shape, be a portion of a neolithic-type stone axe: the surface of the object, however, appears weathered, which it would not be, had it been a part of an implement thrown away within the cave owing to breakage during manufacture; nor would an implement in use shew these signs when broken and left in such a sheltered position.

The second specimen is smooth on one side, slightly rough on the other. It, also, has rather a curious form, and appears to be of a rock similar to that of the above; here again I cannot detect any obvious signs of working. Possibly it is a thin flake removed from the surface of a water-worn pebble.

Before bringing this paper to a close we have still to deal with the pottery.

In the bay first excavated pottery was met with only from the surface to a depth of about one foot, or a little more towards the mouth of the cave, where the deposits were deepest. Several specimens were discovered here. Two of them were seemingly small dishes with circular feet. One is of a stout, blackish coloured ware, and includes a part of the rim; the other is similar except that the ware has a reddish tinge. In both instances the feet have been broken off and only their bases remain. Another object which we found is a small pipkin or water-pot with a roughly tooled pattern on its bottom and the lower parts of its body. Many fragments of this ware were encountered. My Malay coolies said that they thought that pipkins of the same kind were still made in the Siamese Malay States, but that they did not know of any modern articles similar to the two dishes. Some small pieces of pottery of other types were also met with, but none of them were at all remarkable.

In the second bay the pottery found was in small fragments, and was of the same sort as the pipkin.

Let us now see what inferences may be fairly drawn from the objects discovered in the caves. It has been noted that the deposit of shells and bone fragments were not of any great thickness, and from this fact we may conclude that the caves were either inhabited for a comparatively short period of time, or that they were only used at intervals, and that the oldest deposits are, therefore, fairly ancient.

There is, I think, sufficient evidence to warrant our saying that some of the former dwellers in the caves understood the working of stone by chipping, and used stone implements; for two true implements were discovered, and two which are probably so, as well as a fair number of flakes and a distinct

core. The finding of several implements in a cave together with flakes is fairly conclusive evidence that the inhabitants understood the working of stone, but the discovery of a single implement, such as that recorded by Mr. Wray, is not necessarily so. Whether the dwellers in the Lenggong caves knew how to polish, or make, stone implements by a rubbing down process must, on the evidence before us, remain a matter for doubt; but, if they did, and we are to regard the specimens that I have described as being roughly blocked out and unfinished implements of neolithic culture, it is difficult to see into what known Peninsular type, or types, they were to be turned. On the other hand the fact that the stone implements were made by former inhabitants of the Lenggong caves increases the probability of Mr. Wray's polished implement having been made by cave-dwellers too. What relation in point of age the Lenggong deposits bear to those of Gunong Cheroh is, however, uncertain.

With regard to the use of pottery it would seem most probable that the earliest inhabitants of the Lenggong caves did not possess any; but a very little may, perhaps, have been in use while the making of stone implements was still a known art.

XXVI. FOUR NEW BIRDS FROM JAVA.

By H. C. ROBINSON, C.M.Z.S.

DENDROBIASTES HYPERYTHRA VULCANI, subsp. nov.

Adult male:—Very close to *D. f. malayana*, Ogilvie Grant¹, from the mountains of the Malay Peninsula and from Sumatra but differing in having the throat and breast somewhat paler, more yellowish orange, less rufescent, the fulvous wash on the flanks distinctly lighter and the middle of the abdomen whiter. "Iris dark, bill black, feet slaty purplish."

Adult female:—The upper surface more olivaceous than in the corresponding sex of *D. h. malayana*, the throat and middle of the abdomen whiter and the pectoral band and the flanks light yellowish fulvous brown, not rufescent brown. "Iris dark, bill black, feet light pinkish grey."

Dimensions (taken in the flesh). Male: Total length, 113; wing, 59; tail, 46; tarsus, 18; bill from gape, 15 mm.

Female:—Total length, 113; wing, 59; tail, 47; tarsus, 18; bill from gape, 14 mm.

Types:—Collected at Tjibodas, slopes of the Gedeh Volcano, 4-6,000 feet, Western Java, on 14th and 15th February, 1916. ♂ No. 2413. ♀ No. 2365.

Specimens examined:—Twenty-one, from the slopes of the Gedeh, at altitudes from 4,000 to 8,500 feet.

Six males from the Idjen Volcano, near Banjoewangi, Eastern Java, are perhaps even paler and brighter beneath, while a single female, which we have to associate with the males, differs very markedly in having almost the whole of the under-surface pale buffy yellow, the throat and chin being quite concolorous with the breast. In the absence of further female specimens and of examples from Bali I prefer not to describe it.

POMATORHINUS MONTANUS OTTOLANDERI, subsp. nov.

Adult:—Differing from the typical *P. m. montanus* of the mountains of Central and Western Java in having the white superciliary streak not continued past the eye to the base of the bill as is invariably the case in the western race. General colour of back, mantle and flanks rather more chestnut and less ochraceous rufous than in the western form, though this character is only noticeable when large series of each race are compared.

¹ *Muscicapula malayana*, Ogilvie Grant, Bull Brit. Orn Club. XIX., p. 10 (1906).

Measurements of type:—Wing, 94, tail, 105; bill from gape, 26; tarsus, 33 mm. *Type*:—Adult male from Sodong Gerok, Idjen Massif, 3,900 feet, near Banjoewangi, Eastern Java, April 1st, 1916. Very large series examined from the same vicinity from 1,400 feet to 5,000 feet.

Remarks:—Hartert, in a paper on birds from the Ardjuno has already noticed the differences in the superciliary streak (Nov. Zool. iii, p. 539 (1896), while a reference to Horsfield's original description and Plate (Zool. Res. Java (1824) of *P. montanus* show these characters as strongly marked. Horsfield's specimens came from Merbabu in Central and Prahū in West Central Java, while my own material, consisting of over twenty skins, is from the Gedeh in Western Java. Under these circumstances I consider that the eastern form is perfectly entitled to subspecific recognition, though in a considerable number of specimens traces of white are discernible in the loreal region.

STACHYRIS ORIENTALIS, sp. nov.

Separable at a glance from *St. thoracica* (Temm.) from Western Java, (eight specimens examined), in having the whole head and hind neck slaty black, clearly differentiated from the mantle. Rest of the upper surface of a more ochraceous rufescent, less chestnut tinge. Beneath, the white pectoral collar forms a regular gorget and is not encroached upon in the middle of the throat by the black of the chin and neck, as in the western form. White gorget bordered beneath by a black band broadest on the sides of the breast, this band being entirely absent in *St. thoracica*.

Wing, 82; tail, 79; bill from gape, 25; tarsus, 31 mm.

Type:—Adult male from Sodong Jerok, Idjen Massif, 3,900 feet, near Banjoewangi, East Java, on March 28th, 1916.

Thirteen specimens examined.

STACHYRIDOPSIS MELANOTHORAX INTERMEDIA, subsp. nov.

Intermediate between *St. m. melanothorax*¹ (Temm.) from Western Java and *St. m. baliensis* (Hartert)² from Java. Differs from the former in having the middle of the breast sandy buff, uniform with the flanks, not white, and from the latter in having the chin and throat pure white, only very faintly tinged with buff. Outer webs of the primaries, decidedly richer brown than the back but not nearly so bright as the wing coverts.

Adult female (type):—Wing, 60; tail, 60; bill from gape, 19.5; tarsus, 23 mm.

¹ *Myiothera melanothorax*, Temm. Pl. Col. II, pl. 185, fig. 2 (1823).

² *Cyanoderma melanothorax baliensis*, Hartert, Bull. Brit. Orn. Club, XXXVI, p. 2 (1915).

Another female specimen, less adult, wing, 57; tail, 56; bill from gape, 18.5; tarsus 21 mm.

Locality:—Sodong Gerok, Idjen Massif, 3,900 feet, near Banjoewangi, Eastern Java.

I cannot agree with either the late Dr. Sharpe or Dr. Hartert that this bird is correctly placed in the genus *Cyanoderma*, Salvad., of which the type is *Cyanoderma bicolor* (Blyth), from Borneo, which has naked cheeks, whereas the present bird has them feathered.

As Dr. Hartert notes, *St. melanothorax* has been omitted from the Catalogue of Birds (Vol. VII.) but is carefully described by Sharpe in 1884. (*Notes Leyden Mus.* vi., p. 177 (1884).)

XXVII. ON TWO NEW SPECIES OF FLOWER
PECKERS (DICAEDIDAE) FROM THE
MALAY REGION.

By H. C. ROBINSON, M.B.O.U. AND C. B. KLOSS, M.B.O.U.

PIPRISOMA SORDIDUM, sp. nov.

Differs from *P. modestum* (Hume), of the Malay Peninsula, Tenasserim and Siam in the absence of streaks on the under-surface and of white on the tail, from *P. obsoletus* (Mull. and Schleg.), of Timor and Flores in the latter character and in the duller undersurface, from *P. everetti* (Sharpe), of North Borneo and Labuan in the darker underparts and from *P. olivaceus* (Tweed.), of the Philippines in the duller upper surface.

Type:—Adult male, collected on 14th July, 1913, at Rawang, Central Selangor. F.M.S. No. 101/18.

Above dull brown, the feathers of the head with darker centres, the edges of the primaries, secondaries, upper tail-coverts and tail-feathers edged with olivaceous green, broader and greener on the inner secondaries. Beneath dull fuscous, chin and throat and the centre of the belly, whitish; under tail coverts whitish with greyish centres. Under wing coverts and axillaries, greyish, with dark centres to the former; sides of the face and lores greyish brown, malar region somewhat darker. Tail feathers with no traces of white.

Dimensions (in skin):—Wing, 60; tail, 33; tarsus, 13.5; bill from gape, 11 mm.

Remarks:—This bird is probably only a subspecies of *P. everetti*, Sharpe, Ibis 1877, p. 16; id. P.Z.S. 1879, p. 343, Pl. XXX, fig. 1, from which it differs in its very much darker colour beneath.

DICAENUM VAN HEYSTI, sp. nov.

Nearest to *D. ignipectus* (Hodgs.), of the Himalayan countries and the mountains of the Malay Peninsula but entirely lacking any red in the plumage or any black abdominal patch, which character also separates it from *D. beccarii*, of W. Sumatra.

Type:—Male (vix adult), from Beras tagi, Mountains of NE. Sumatra, collected on 10th June, 1917, by A. D. van Heyst. Collector's No. 517.

Above like *D. ignipectus*, but the metallic colouring with a more greenish cast. Below, throat and upper breast almost pure white, flanks and sides of the breast dusky, slightly tinged

with olive. Abdomen olivescient, under tail coverts buffy with black bases. Axillaries and under wing coverts silky white; sides of the head slaty black.

Wing, 48; tail, 23; tarsus, 13; bill from gape, 10.5 mm.

Female:—Differs from the female of *D. ignipectus* in being more greenish and darker beneath, only the breast and abdomen being slightly washed with ochreous buff. (No. 512).

Specimens examined:—Three, the above mentioned male and female and an immature male, resembling the female, all collected at the same locality and on the same date.

Remarks:—There is little doubt that these specimens represent a species allied to but quite distinct from the continental *D. ignipectus*, the total absence of the black pectoral patch being the most characteristic feature. They cannot apparently be referred to *Dicaeum sollicitans*, Hartert from Java.

XXVIII. FURTHER NOTES ON THE MONGOOSES OF THE MALAY PENINSULA.

By C. BODEN KLOSS, F.Z.S

When I wrote the article on the Mongooses of the Malay Peninsula published in the last number of this Journal (pp. 123-5; September, 1917), some skulls were missing which have since been recovered and I am now able to give their measurements.

It will be seen that the skulls do not confirm the slight difference in size in favour of *Mungos javanicus peninsulae* over *Mungos incertus* indicated by the collector's external measurements taken in the flesh, but show that the two are of practically similar dimensions or that the difference, if any, is rather the other way about. The only difference between the skulls of the two species lies in the bullae, which in *incertus* are rather larger and this feature, with the colour differences, constitutes the distinction between the two.

The skulls of these indigenous Malayan animals differ from that of *Mungos mungos* in their greater length, that of *mungos* being shorter both actually and relatively to its breadth and having a shorter tooth row.

MEASUREMENTS OF *Mongooses* IN MILLIMETRES.

| | Mungos j peninsulae | | | M incertus | |
|--|---------------------|-----------|-----------|------------|-----------|
| Number | 951/11 | 971/13 | 955/11 | 1057/10* | 68/17 |
| Sex and age | ♀ ad | ♂ old | ♂ ad | ♂ ad | ♀ aged |
| Head and body .. | 373 | 364 | 371 | 350 | 361 |
| Tail | 282 | 276 | 254 | 276 | 265 |
| Hind foot | 71 | 57 | 63 | 63 | 62 |
| Ear | 29 | 23 | 23 | 20 | 22 |
| Skull and teeth. — | | | | | |
| greatest length .. | 71 | 78 | 77 | 78 | 80.5 |
| basilar length, from back of 1 st | 65 | 69.8 | 64.4 | 70 | 72 |
| palatal length | 34 | 37.2 | 36 | 36 | 40 |
| c-m ² (alveoli) | 25.7 | 26.6 | 27.5 | 26.2 | 27.5 |
| pm ⁴ , length and greatest diameter | 7.7 × 8.2 | 7.0 × 7.6 | 7.2 × 8.1 | 7.0 × 6.0 | 7.2 × 8.1 |
| rostral breadth across roots of canines | 14 | 13.6 | 13 | 13 | 14.4 |
| postorbital breadth .. | 14 | 11 | 9.9 | 10.5 | 11 |
| braincase breadth .. | 26 | 26 | 25 | 25 | 25.3 |
| zygomatic breadth .. | 38.2 | 39.2 | 37 | 38.2 | 40.8 |
| length of bullae from the external base. .. | 16 | 16.1 | 15.5 | 16.7 | 16.7 |

* Type.

XXIX. ON THE SOUTHERN MALAYAN RACE OF THE WHITE-WHISKERED PALM-CIVET.

By H. C. ROBINSON AND C. B. KLOSS.

We have long thought that the Southern Malayan Race of *Paguma leucomystax* originally described by J. E. Gray from Sumatra was subspecifically distinct, but in the absence of fully adult specimens of the adjacent races have hitherto refrained from describing it.

We are now, however, in possession of fine adults of the true *P. leucomystax* from West Sumatra, *P. robusta*, (Miller), from the north of the Peninsula and of the Southern Malayan form which we propose to describe as

PAGUMA LARVATA ANNECTENS, subsp. nov.

Type:—Adult male (skin and skull), F. M. S. Mus. No. 191/09, collected at Bukit Gantang, Larut, Perak, November 1908, by Museum Collector.

Diagnosis:—Intermediate between the colder, greyer race from Trang and the deep maroon-black form, *P. leucomystax*, from Sumatra.

Colour:—Nape, mantle, upper and lower extremities brownish black, the nape and mantle having the under fur tipped with buffy; posterior parts of the body more yellow tipped and annulated with black, the general orange effect being richest on the rump; flanks slightly duller; tail like the rump, basally, becoming blackish on the distal half. Under-surface dull buffy. Top of muzzle slightly grizzled buff. A broad area extending from the eye to the ear and more narrowly down the sides of the neck, buff. Crown grizzled brown and buff. Sides of muzzle, chin and throat brownish; ears brownish black. Vibrissae white.

Dimensions:—(External dimensions of the type, taken in the flesh):—Head and body, 635; tail, 610; hindfoot, 102 mm.

Cranial measurements: greatest length, 127 (126¹); upper length, 112 (116); condylo-basilar length 120 (121); basilar length, 115 (116.4); palatilar length, 57 (57); width of palate, including molars, 42.8 (41); interpterygoid space 25 by 13.2 (27 by 14); breadth of rostrum across the roots of canines, 24.7 (24); zygomatic breadth, 71 (69); anteorbital constriction, 26.2 (25.4); postorbital constriction, 25 (22.4); breadth of brain case above roots of zygomata 41 (41.4); mastoid breadth, 48 (45); occipital depth, 30.2 (30.4); mandible 94 (94); maxillary tooth row exclusive of incisors 43 (44); mandibular tooth row, exclusive of incisors 48.3 mm. (50).

¹ Measurements in parentheses are those of the type of *Paradoxurus robustus* Miller, Proc. Biol. Soc. Washington, XIX, p. 26 (1906).

Specimens examined:—Five from Perak and one from Selangor.

The series of the genus before us, ranging from the Northern Shan States to Sumatra show that complete gradation occurs between forms assigned to *P. larvata* (Temm.) and *P. leucomystax*. All races of the genus must therefore be regarded as subspecies of the originally described *P. larvata*.

The synonymy of the Malayan form is much involved and many of the earlier names have no exact locality cited. We have been unable fully to examine the literature, but it is possible that *Paradoxurus jourdani*, Gray, in Charlesworth, Mag. of Nat. Hist. I., p. 579 (1837) applies to the above described form, in which case, of course, Gray's name has priority.

The various races will be:—

Paguma larvata larvata (H. Smith). S. China.

Paguma larvata taiwana (Swinh.). Formosa.

Paguma larvata hainana, Allen. Hainan.

Paguma larvata intrudens, Wroughton. N. Shan States (Goteik).

Paguma larvata grayi (Bennet). Himalayas and Sikkim.

Paguma larvata tytleri (Tytler). Andaman Islands.

Paguma larvata robusta (Miller). Tenasserim and N. Malay Peninsula.

Paguma larvata annectens, *antea* p. 243. S. Malay Peninsula.

Paguma larvata leucocephala (Gray). Borneo.

Paguma larvata leucomystax (Gray). Sumatra.

The generic status of *Paradoxurus laniger*, Hodgson, from Tingri, Tibet, which is only known from a skin and of *Paradoxurus musschenbroeki*, Schleg., from Celebes is uncertain.

XXX. NOTES ON MALAYAN AND OTHER MOUSE-DEER.

By C. BODEN KLOSS, F.Z.S.

There is in the Federated Malay States Museums a fairly large collection of *Tragulidae* from the Malay Peninsula and the immediate neighbourhood, and as there are available for the moment specimens from Borneo (belonging to Mr. H. C. Robinson) and from Siam (in my possession), the opportunity has been taken to review all this material.

In dealing with Mouse-deer in large series one cannot fail to be impressed with the large degree of individual variation that exists in adults as regards colouration, skull and dental characters and also size; and it is obvious that races must be judged, not by individuals, but by the average, or majority, features of series.

The only real differences amongst Malaysian¹ animals seem to be those of colour and these differences are so intimately mingled geographically that it seems best to regard all races as belonging to two species only—*javanicus* and *kanchil*.

Malays have various names for Mouse-deer—in the Peninsula there are current *napu* (*napoh*) and *munkonong* (*bəngkunang*), *pelandok*² and *kanchil*: the last two names are interchangeable but as a rule *munkonong* and *kanchil* are applied to the young of *napu* (Greater Mouse-deer) and *pelandok* (Lesser Mouse-deer) respectively.

I have proposed type localities for two old names hitherto undetermined; rejected two races proposed; and described two new ones.

TRAGULUS JAVANICUS NAPU.

Moschus napu, F. Cuv., Hist. Nat. Mamm., III, livr. 37, pl. 329 (1822).

Tragulus javanicus, Cantor, Journ. Asiat. Soc. Bengal, XV, 1846, p. 269.

Tragulus napu, Flower, P.Z.S., 1900, p. 374; Wroughton, Journ. Nat. Hist. Soc., Bombay, XXIII, 1915, p. 717.

Tragulus canescens, Miller, Proc. Biol. Soc. Washington, 1900, p. 185; id., Proc. U. S. Nat. Mus., XXXVII, 1909, p. 5; Kloss, Journ. F.M.S. Mus., II, 1908, p. 148; id., op. cit., IV, 1911, p. 138.

Tragulus javanicus canescens, Kloss, Journ. Straits Branch Roy. Asiat. Soc., No. 53, 1909, p. 43; Lydekker, Cat. Ungulates, Brit. Mus., IV, 1915, p. 271.

¹ Malaysian—Pertaining to the Malay Peninsula, Sumatra, Borneo and Java. Malay—Pertaining to the Malay Peninsula, c f. Sumatran, etc

² Final *k* silent.

When Miller gave the name *canescens* to the Malayan Greater Mouse-deer he compared it with the napu of Lingga Island, later named *T. pretiosus* by him¹ in the belief that the latter represented typical *T. javanicus napu*. He has since written "*Tragulus napu* (of Sumatra) proves to be a greyish animal quite distinct from *T. pretiosus* but somewhat closely resembling *T. canescens* of the Malay Peninsula,"² and again later "The common peninsular *Tragulus canescens* differs very slightly, if at all, from the Sumatran *T. napu*. In naming it I was under the impression that the napu of Lingga Island (*T. pretiosus*) represented the Sumatran animal."³

When Wroughton wrote (*l.c.s.*) of South Tenasserim animals "Geographically they should be the *T. canescens* of Miller, but differ so markedly in several characters from his description that I prefer to retain the older name," he was perhaps unaware of this or that Miller's description, being wrongly based, might convey a wrong impression.

I have compared a series ranging from South Tenasserim to Singapore, with specimens from Sumatra and cannot find any differences: and as long as the occurrence of a distinct race in the Peninsula remains unproven, as seems to be the case, we have no right to use a distinct name for Malayan animals which should therefore stand as *T. j. napu*.

Habitat:—Sumatra and the Malay Peninsula.

Specimens examined:—Fourteen.

TRAGULUS JAVANICUS UMBRINUS.

Tragulus umbrinus, Miller, Proc. Biol. Soc. Washington, XIII, 1900, p. 191.

Tragulus (canescens) umbrinus, Kloss, Journ. F.M.S. Mus. II, 1908, p. 148; id. (partim) Journ. Straits Branch Roy. Asiat. Soc., No. 53, 1909, p. 44.

Tragulus javanicus umbrinus, Lydekker, Cat. Ung. Brit. Mus., IV, 1915, p. 273.

"Similar to *T. canescens* of the adjacent mainland but smaller in size and much darker in colour. Throat stripes blackish brown with scarcely a trace of pale speckling. Belly heavily washed with fulvous grey" (*Miller*).

We have only one rather immature example from the Langkawi Islands but it closely agrees with the above characterization. It is of a richer yellow than the mainland animal and more heavily clouded with blackish—the two colours more finely intermixed—and the sides of neck and body and the

¹ Proc. Acad. Nat. Sci. Philadelphia, 1902, p. 144.

² Proc. U. S. Nat. Mus., XXVI, 1903, p. 439

³ Proc. U. S. Nat. Mus., XXXVII, p. 5.

limbs darker. Below, the chevron on the foreneck is brownish black, scarcely grizzled, the collar is darker, and the whole middle part of the body is suffused with brownish-yellow, leaving only the pectoral and inguinal areas white: in peninsular animals there is at most a broad Y-shaped patch on the under-body.

Habitat: - Langkawi Islands, West Coast of the Malay Peninsula.

TRAGULUS JAVANICUS TERUTUS.

Tragulus canescens umbrinus, Kloss (partim), Journ. Straits Branch Roy. Asiat. Soc., No. 53, 1909, p. 44.

Tragulus canescens terutus, Thomas and Wroughton, Ann. Mag. Nat. Hist., (8) IV, 1909, p. 536.

Tragulus javanicus terutus, Lydekker, Cat. Ung. Brit. Mus., IV, 1915, p. 272.

Seven examples collected between the end of February and the middle of March:—Like *T. j. napu* of the adjacent mainland but rather brighter generally, the sides more like the colour of the back, not greyish. Nape stripe obsolete, in some instances only just traceable: under side of body sometimes with a broad brownish band as in *T. j. umbrinus*, but the chevron of the foreneck paler and much grizzled with ochraceous as in *T. j. napu*.

One example is abnormal: on the foreneck the median white stripe is represented by a few hairs only, the rest of the neck between the white lateral stripes being blackish-brown grizzled with ochraceous.

Twelve examples collected in December:—much darker than the above owing to a general increase in pigmentation, the upper parts as dark or darker than dark Bornean animals (postea), the neck chevron much blacker and the middle part of the under body more extensively fulvescent—the latter area being slightly suffused with black also. Two specimens have the foreneck coloured as in the abnormal example mentioned above: in one of them the lateral white stripes are merely represented by two small patches.

Though the two series look notably different all the animals are easily separable from the mainland race by their yellowish (not grey) sides. The differences in colour *inter se* appears to indicate that there are seasonal pelages and that the change from dark to light phase takes place about January.

Probably a trifle smaller than the mainland race: the largest specimen examined has the hindfoot, c. u., 135 mm; the greatest length of skull 111 mm: a large Malayan napu measures 150 and 118 mm. respectively.

Habitat:—Terutau Island, north of Langkawi Island, West Coast of the Malay Peninsula.

TRAGULUS JAVANICUS BORNEANUS.

Tragulus borneanus, Miller, Proc. Biol. Soc. Washington, XV, 1902, p. 550, Lyon, Proc U S Nat Mus., XXXIII, 1907, p. 550

Tragulus napu borneanus, Lyon, op. cit., XL, 1911, p. 64.

Tragulus javanicus borneanus, Lydekker, Cat Ung. Brit. Mus., IV, 1915, p. 270.

Of six specimens from Paku Saribas, Sarawak, two are indistinguishable in general colouration from the Sumatran and Malayan *napu* the others are more heavily clouded with black above. On the whole, the neck chevron is darker, the dark element being more intensely black, less brownish black.

Of two specimens from the Kapuas R, Western Borneo, Lyon says 'The skins are practically indistinguishable in coloration from specimens of *T. napu* from Sumatra.' Later, dealing with a large series, he sums up the position as follows —

A careful comparison of these with a large number of specimens from various localities in Sumatra, the type-locality of *napu*, shows that the Sumatran and Bornean *napus* are almost identical in point of size, color, and cranial characters. The Bornean animal averages a very little smaller in most external and cranial measurements. At the same time the throat markings are slightly darker and the collar slightly wider than they are in typical *napu*. These differences, however, are very slight and not at all constant, and it is only possible to identify with certainty a little over half the specimens in each series."

Habitat — Borneo and Pulau Laut

Specimens examined — Six

TRAGULUS JAVANICUS STANLEYANUS

This race was based by Gray on living animals of unknown provenance. Various suggestions have been made as to the habitat — the Sunda Islands by Milne-Edwards, and the Malay Peninsula by several other writers. Twenty years acquaintance with Malaysia, however, has convinced me that no such form occurs on the mainland and that the examples known to Gray came from Battam Island, opposite Singapore, on the south side of the Strait, whence to this day living animals are not infrequently brought over and offered for sale in the Singapore bazaar.

Gray's description exactly fits the Battam race and Singapore is so obviously a port from which living animals might have been taken to England that I feel one would be wilfully blind to facts in refusing to accept Battam Island as the typical locality of *stanleyanus*, though Miller, while *stanleyanus* was looked on as a species of undetermined provenance, has described the Battam *stanleyanus* (first rediscovered by myself) as *Tragulus perflavus*.

The race also occurs in the adjacent islands of Gallang, Setoko and Bulang; and a closely allied form, *T. flavicollis*, inhabits the neighbouring island of Sugi.

The original description is as follows:—"Rufescent fulvous, the hairs with black tips, below less bright; neck and chest bright fulvous; border of the chin, three stripes on the foreneck, breast, front and inner side of the thighs and the under side of the tail white; crown and feet to the knees darker fulvous; muzzle, stripes about the eyes on both sides, outer sides and margins of the ears black . . . immediately distinguishable from all the other species by the brightness of its colouring, and by the absence of the nuchal streak, and of the white on the under surface of the body."

Mr. Oldfield Thomas has kindly supplied me with details of the type, which was certainly a large individual; but the dimensions are not greater than might be, and are, attained by Battam animals, for every race of Mouse-deer shows a considerable range in size when a series is examined.

The measurements are:—Hindfoot, including hoof, 134; upper extreme length of skull, 123; condylo basal length of skull 117; tooth row 43.5.

It was an old female with worn teeth that had lived in confinement, but the skull is sound and perfect: B.M. Reg. No. 48. 10.11.16

Battam animals vary a little in the amount of black clouding on the upper surface of the body and in examples where it is strongest the chevron of the fore-neck is also a little blackened.

Specimens examined Three at the moment of writing, though many more have passed through my hands.

The synonymy will be:—

Moschus stanleyanus, Gray, P.Z.S. 1836, p. 65 (et Auct.).

Tragulus perflatus, Miller, Proc. U. S. Nat. Mus., XXXI, 1907, p. 251; Lyon, *ibid.*, p. 65; *id.*, op. cit., XXXVI, 1909, p. 481; Miller, op. cit., XXXVII, 1909, p. 7, pl. 2, lower figure; Kloss, Journ. Straits Branch Roy. Asiatic Soc., No. 50, 1908, p. 70.

Tragulus stanleyanus perflatus, Thomas and Wroughton, Journ. F.M.S. Mus. IV, 1909, p. 128; Lydekker, Cat. Ung. Brit. Mus. IV, 1915, p. 267.

TRAGULUS JAVANICUS FORMOSUS.

Tragulus formosus, Miller, Proc. Biol. Soc. Washington, XVI, 1903, p. 34; *id.*, Proc. U.S. Nat. Mus., XXI, 1906, p. 251; *id.*, op. cit., XXXVII, 1909, p. 6.

Tragulus stanleyanus formosus, Thomas and Wroughton, Journ. F.M.S. Mus., IV, 1909, p. 129; Lydekker, Cat. Ung. Brit. Mus., IV, 1915, p. 267.

Only one specimen is available: it differs from the Battam race principally in having the top of the face and head blackish and a somewhat blackened nape stripe; the clear colour of the neck does not extend on to the withers, which are darkened, the chevron of the foreneck is considerably more blackened, the collar is broader and the belly is a darker, more blackened fulvous. The form is somewhat variable and some individuals closely approach Battam animals.

Habitat. Birtang Island, Rhoo Archipelago.

TRAGULUS JAVANICUS RUFULUS.

Tragulus rufulus, Miller, Proc. Washington Acad. Sci., 11, 1900, p. 227; Thomas, Journ. F.M.S. Mus. II, 1908, p. 106.

Tragulus (javanicus) rufulus, Kloss, Journ. Straits Branch Roy. Asiat. Soc. No. 53, 1909, p. 44.

This is the most brilliantly coloured of all mouse-deer, exceeding both *stanleyanus* and *formosus* in richness of tone. Neck deep ochraceous-orange, upper parts of body orange-rufous, rump and tail brilliant rufous brown: the black clouding which obscures the colour of the body is variable; in one or two examples of a large series it is practically absent; it is always slight on the limbs. The top of the head is like the back and generally there is a faintly indicated nape stripe of orange-rufous. The foreneck markings are like the sides of the neck but the chevron is frequently slightly sprinkled with black. The underside of the body is primarily white but in various ways there is an encroachment of fulvous: in only one example does the latter colour completely cover the belly between breast and inguinal regions, though* the white between these areas is not infrequently reduced to two broad elongate patches separated by a fulvous median area which is generally blackened.

This character, as well as the nape stripe and brighter colour, separates *rufulus* from the Battam and Bintang animals: otherwise it would have some claims for consideration as *stanleyanus*: but it is highly improbable that material from such a little known and remote island as Tioman ever came to the notice of Europeans in the middle of last century.

Habitat. Tioman Island, East coast of the Malay Peninsula.

Specimens examined. Twenty.

TRAGULUS KANCHIL FULVIVENTER.

Moschus fulviventer, Gray, P.Z.S. 1836, p. 65.

This "drifting" name has been the cause of a good deal of uncertainty and inconvenience because the exact provenance of the types is unknown: it was suggested that they came

from the "Malay Archipelago and Peninsula"—a region which, with Indo-China, covers the entire range of the *kanchil* group or species¹.

Personally I regard the types of *fulviventris* and similar animals as somewhat abnormal individuals showing an unusual development of fulvescence, but I propose to attach the name to animals from Singapore and the Malay Peninsula, selecting the former as the type locality, with the range extending to between 6 and 7° N. latitude and including the Redang Islands off Tiengganu, and the Langkawi Islands, for the following reasons:—

Cantor, writing of Malay in pelandoks under *I. kanchil* and giving Singapore first among the localities says "The colour and distribution of the marks of the chest and abdomen are liable to individual variations, one of which gave rise to the supposed species *Moschus fulviventris*" (Journ. Asiatic Soc. Bengal XV, 1846, p. 268).

Thomas and Wroughton record two specimens from Singapore sent by us to South Kensington as *I. k. fulviventris* and state "Comparison with the type shows that these are undoubtedly Gray's species (Journ. Ind. Malay States Mus. IV, 1909, p. 128).

Of about 3 dozen specimens in the I. M. S. Museum² from the range given above rather more than one third have in varying degree the abdominal pattern described by Gray, and three of them show further the fulvous band on the throat separating the white of the chin from the white streaks of the foreneck which is referred to in his supplementary description.

The latter feature, together with an extension of fulvous over the underparts of the body which restricts the white to areas on the chest and abdomen and in the region of the thighs, is the distinguishing character of *fulviventris* in its more richly coloured phase and though animals with such a phase are in the minority I think there is no doubt that they represent Gray's race, the more so that Singapore or Malacca are very probable places at which Hudwicker may have obtained the specimens seen by Gray.

The majority of the animals, however, which should now be regarded as *fulviventris* lack the fulvous band behind the chin and have the underside of the body white with a line of varying width and colour running from the collar to the abdomen where it broadens out. When distinct white anterior and posterior areas occur they are brought about by an extension of fulvous from the sides to join the broad fulvous area on the abdomen. The back of the upper part of the forelimbs is always white.

¹ It may be pointed out that Stone and Rehn are wrong in stating that "Gray attributes this species with a query to Malacca and the Indian Peninsula" (Proc. Acad. Nat. Sci. Philadelphia 1902 LIV pp. 130, 132) while Bonhote is equally incorrect in saying that the habitat is "Malacca as is stated by Gray" (Ann. and Mag. 1903 XI p. 292). The habitat originally given was "In Insulis Malaicis, et in Peninsula Indiarum Orientalis".

Habitat: —See above.

Specimens examined: —Thirty-three.

The synonymy will be as follows:—

Moschus fulvirens, Gray, l.c.s.

Tragulus kanchil, Cantor (partim), l.c.s. (Singapore and Malay Peninsula), Thomas (partim), P.Z.S. 1886, p. 79 (Selangor and Singapore).

Tragulus javanicus, Flower (partim), P.Z.S. 1900, p. 374 (Perak, Selangor and Singapore); Bonhote (partim), op. cit. p. 863 (Kelantan).

Tragulus fulvirens, Stone and Rehn, Proc. Acad. Nat. Sci. Philadelphia, 1902, LIV, p. 130, t. 2. (Malacca and Indian Peninsula).

Tragulus rarus, Kloss (partim), Journ. F.M.S. Mus., II, 1908, p. 148 (Malay Peninsula region), id. op. cit. IV, 1911, p. 212 (Redang Ids.), (Cydenstolpe Arkiv for Zoologi, Stockholm, X, 1917, p. 31 (Perak)).

Tragulus kanchil rarus, Bonhote, Journ. F.M.S. Mus. III, 1908, p. 11 (Pahang); Kloss, op. cit. IV, 1911, p. 44 (Pahang); Robinson and Kloss, op. cit. VI, 1916, p. 238 (Kedah).

Tragulus kanchil rarus, Kloss, Journ. Straits Branch Roy. Asiat. Soc., No. 53, 1909, p. 43 (Malay Peninsula and Singapore).

Tragulus kanchil fulvirens, Thomas and Wroughton, l.c.s. (Singapore), Lydekker, Cat. Ungulates Brit. Mus., IV, 1915, p. 285 (Singapore).

2. *FRAGULUS KANCHIL LANCAYENSIS*

Tragulus kanchil, Cantor (partim), Journ. Asiat. Soc. Bengal, XV, 1846, p. 53 (Lancay Islands).

Tragulus javanicus, Miller (partim), Proc. Biol. Soc. Washington, XIII, 1900, p. 192.

Tragulus lancayensis, Miller, op. cit. XVI, 1903, p. 41.

Tragulus rarus lancayensis, Kloss, Journ. F.M.S. Mus., II, 1908, p. 148, id., Straits Branch Roy. Asiat. Soc. No. 53, 1909, p. 44.

Miller separated animals of Langkawi Island from *T. k. rarus* of Trang (postea), as being more brightly coloured with, in general, a rather greater extension of fulvous on the underparts. Such indeed are the differences in this connection but I find myself quite unable to separate Langkawi examples from the more southern form *fulvirens*.

Habitat: —Langkawi Island, West Coast of the Malay Peninsula.

Specimens examined: —Seven.

TRAGULUS KANCHIL. PENANGENSIS, subsp. nov.

Type.—Adult male (skin and skull), F. M. S. Mus. No. 1542/11. Collected at Telok Bahang, Penang Island, on 11th March, 1911, by E. Seimund.

Diagnosis.—Colour more intense than in *T. k. fulviventer*. Upper parts Mars yellow, rather rufous on neck and forelimbs; hind-limbs tinged with umber brown: back much blackened; nape stripe very distinct, black and slightly grizzled; head speckled brown and ochraceous. Chevron on the foreneck mingled Mars yellow and black: collar band and a line down the centre of the breast clear Mars yellow; an ochraceous-orange Y-shape patch stretching from the posterior chest to the abdomen: remainder of under-part, back of forelimbs, front of thighs and underside of tail white.

Measurements.—Head and body, 465; tail, 70; hindfoot, c. u., 115; ear, 37 mm.

Skull.—greatest length, 99; condylobasal length, 91; upper molar row (alveoli), 36; greatest breadth of skull, 44 mm.

Specimens examined.—Three adults and a juvenile from the type locality.

Remarks.—These Penang animals closely resemble an example of *T. k. rubens*, Miller, of Bintang Island, Rhio Archipelago, the specimen of which only differs in having a darker head and an intensely black nape-stripe, but the latter feature is apparently not typical. The juvenile animal (hind-foot, c. u., 103 mm.) is much more fulvous as the whole of the under-body and limbs are suffused with orange-ochraceous except for two small white spots on the chest; the hairs, however, have white bases throughout: also on the throat there is a broad oblique fulvous band separating the white behind the chin from that of the foreneck. The last is a feature of *fulviventer*, Gray, but the Penang animals are far too brightly coloured to be referred to that race.

TRAGULUS KANCHIL. RAVUS.

Tragulus rarus, Miller, Proc. Biol. Soc. Washington, XV, 1902, p. 163.

A slightly paler, duller race than *T. k. fulviventer* from southern part of the Malay Peninsula, yellower and less ochraceous, rather less blackened above, with the nape stripe less intense and distinct. The colouring of the undersurface, though a little paler, is disposed as in *fulviventer* and about the same proportion have the white of the chest similarly separated from that of the abdomen. It appears necessary to recognise it as distinct from *fulviventer* though series for series, it is not a strongly marked race. Some animals are very different, however.

Originally described from Trang, Peninsular Siam, the known range is from Perlis (on the west coast), north to

Bandon. Three examples from Patani, on the east coast of the Peninsula in the same latitude as Perlis, are intermediate though rather duller than *fulviventris*; they have the nape stripes equally pronounced: with these should probably be associated animals from Patani recorded by Bonhote as *Tragulus javanicus* (P.Z.S. 1900, p. 883; Biserat and Bukit Besar) and others as *Tragulus kanchil affinis*. (Fasciculi Malayenses, Zool. I, 1903, p. 42; Jalor); otherwise the synonymy probably includes all references to examples from the range given above.

When describing *ravus* Miller stated that it was distinguishable from *T. k. kanchil* of Sumatra by its pallid colouration (l. c. s., p. 174). The same difference distinguishes it from *fulviventris* and I regret that I am not in a position to compare *fulviventris* with *kanchil* of which we have no specimens.

Habitat:—As above and Pulau Lontar, Coast of Trang

Specimens examined:—Seventeen.

TRAGULUS KANCHIL RAVUS.

Tragulus javanicus, Miller (partim), Proc. Biol. Soc. Washington, XIII, 1900, p. 192.

Tragulus ravulus, Miller, op. cit. XVI, 1903, p. 41.

T. k. ravulus differs from *T. k. ravus* in being paler, i.e., yellower (especially the thighs) and less blackened above. Below, the neck markings are decidedly lighter with less admixture of black and there is less tendency for the yellow element to extend over the body.

Habitat and Specimens examined:—Four from Pulau Adang (typical locality), and five from Pulau Rawi, Butang Ids.

TRAGULUS KANCHIL ANGUSTIAT, subsp. nov.

Tragulus kanchil rarus, Wroughton, Journ. Bombay, Nat. Hist. Soc. XXIII, 1915, p. 747 (S. Tenasserim), Kloss, Journ. Nat. Hist. Soc. Siam, II, 1916, p. 29 (Pativu).

Type:—Adult male (skin and skull). Collected at Bankachon, Victoria Point, South Tenasserim, on 15th December, 1916, by G. C. Shortridge. Original No. 4513 of the Bombay Natural History Society's Mammal Survey.

Diagnosis: Colour as in *T. k. rarus* of Trang, but nape stripe well defined and withers darker, as in *fulviventris*. The type and a second specimen have the white of the breast separated from that of the abdomen by a Y-shaped fulvous extension from the sides.

Measurements.—Head and body, 460; tail, 73; hindfoot, 127; ear, 36. Skull: greatest length, 94.5; condylo-basal length, 88; upper molar row (alveoli), 32; greatest breadth, 44 mm.

Specimens examined:—Four from the typical locality and one from Maprit, Pativu, S.W. Siam, in the same latitude.

Remarks.—The Lesser Mouse-deer has been recorded as far north in Burma as Yéin Tenasserim (vide Blyth, P.Z.S. 1864, p. 483), to which point the present form probably extends. Specimens obtained by Gyldenstolpe at Hat Sanuk in S.W. Siam, near the Tenasserim boundary (about 11° 45' N. lat.) are probably the same also (vide *T. k. affinis* Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl. 57, No. 2, p. 52, 1917).

TRAGULUS KANCHIL AFFINIS.

Tragulus affinis, Gray, P. Z. S. 1861, p. 137 (Cambodia).

Tragulus javanicus, Flower, P. Z. S. 1900, p. 374 (Dong Phya Fai, Siam).

Tragulus kanchil pierreii, Bonhote, Ann. and Mag., XI, 1903, p. 293 (Cochin-China); Lydekker, Cat. Ungulates, Brit. Mus. 1915, p. 291 (Pechabun in Siam, Cambodia, Cochin-China)¹.

Tragulus kanchil affinis, Bonhote, P. Z. S. 1907, I, p. 11 (South Annam); Kloss, P. Z. S. 1916, p. 63 (S. E. Siam), id., Journ. Nat. Hist. Soc. Siam II, 1916, p. 86 (S. E. and E. Siam).

This race differs from *angustiac* and *raus* in being still duller with the nape stripe obsolete or entirely absent: it most nearly resembles *raus* but is yellower on the neck and limbs and the mingling of colours on the upper parts of the body is more noticeable in the form of annulations. Where it meets the Burmese and Peninsular form is not yet ascertained but I have specimens from the range of mountains between Ayuthia and Korat.

Habitat.—South Annam, Cochin-China, Cambodia and Siam.

Specimens examined.—Five.

TRAGULUS KANCHIL WILLIAMSONI.

Tragulus kanchil williamsoni, Kloss, Journ. Nat. Hist. Soc. Siam, II, 1916, p. 88.

Like *affinis* but larger and with the upper-parts deeper ochraceous and only moderately annulated with brown (hind-foot, c. u., 125; greatest length of skull 103 mm).

Specimens examined.—The type from Muang Pre, North Siam, which is the most northerly example known of the Lesser Mouse-deer.

TRAGULUS KANCHIL HOSEI.

Tragulus kanchil hosei, Bonhote, Ann. and Mag., XI, 1903, p. 292; Lydekker, Cat. Ung. Brit. Mus., IV, 1915, p. 290.

Tragulus virgicollis, Miller, Proc. Biol. Soc. Washington XIII, 1903, p. 37.

¹ *Tragulus kanchil affinis*, Lydekker, (t. c. p. 286) is an impossible subspecies made up of animals ranging from the Malay States north to Tenasserim and thence through Siam to S. Annam.

The only specimen available (from Paku Saribas, Sarawak), is both paler and darker than any Malayan race; the upper parts having the fulvous element much more buffy and the blackish clouding much heavier and extending over the head, neck, hind-limbs and tail: only the proximal parts of the fore-legs are clear ochraceous orange and the hind-legs are only very slightly tinged with Sudan brown. Cheeks pale buffy, top of head blackish-brown, nape stripe broad and black: neck-chevron like the sides of neck but more blackened, collar like the sides of neck but less blackened; a median ochraceous patch on the abdomen joined to the collar by a narrow line; remaining underparts white.

This example is not typical as it differs from those described by Bonhote (Baram River, N. Sarawak), and Miller (Mt. Dulit, 3,000 feet, N. Sarawak), in having the neck grizzled with black, not clear coloured.

(The only other known continental form of the genus *Tragulus* (s.s.) is *Tragulus versicolor* of South Annam (Thomas, Ann. & Mag. V, 1910, p. 535). It is regarded by Lydekker as a subspecies of *javanicus* (Cat. Ung. Brit. Mus., IV, 1915, p. 289) but is an animal of very distinct characters—larger than *kanchil*, smaller than *javanicus*; anterior half of body fulvous, posterior grey; these colours meeting abruptly behind the shoulders. In the present state of our knowledge it is of very isolated occurrence for no napu has yet been recorded from the region between Tenasserim and Annam.

XXXI. ON A COLLECTION OF MAMMALS
FROM THE BENCOOLEN AND PALEMBANG
RESIDENCIES, SOUTH WEST SUMATRA:

(Plate V. fig. 1.)

By H. C. ROBINSON and C. BODEN KLOSS.

With itinerary and field notes by the Collector, E. Jacobson.

We owe to Mr. E. Jacobson, who is well known as an enthusiastic collector of all groups of the animal kingdom and who has done much to elucidate the fauna of many little known districts in Netherlands India, especially the island of Simalur in the Barussan Chain¹ of islands off the west coast of Sumatra, the opportunity of studying a collection of mammals obtained chiefly in the neighbourhood of Bencoolen but also on the Dempo Volcano in the western border of the Palembang Residency. The collection is of special interest as it provides modern and well collected specimens of several of the species originally described by Sir Stamford Raffles from this region which were badly needed for purposes of comparison.

As will be seen, most of the species of Rodents are identical with those recently obtained by ourselves in the Korinchi District, some distance to the north; but we have had occasion to describe two additional forms.

Systematic:

Tupaia minor humeralis subsp. nov.

Rhinosciurus laticaudatus saturatus subsp. nov.

ITINERARY.

By E. JACOBSON.

"From 29th May till 4th June 1916 I collected in the immediate surroundings of Bencoolen, which place is about 5 m above sea level and situated on the west coast of Sumatra. On the 3rd June I went for a day to Talang Ampat, 17 km. to the east of Bencoolen and at an altitude of 40 m. Some collecting was done there.

On the 6th June I moved to the Government resthouse at Rimbo Pengadang, going there by motor-car *via* Kepahiang. The road from Bencoolen to Kepahiang crosses the Barisan Mountain-range over a pass 765 m.; Kepahiang itself being on a height of 500 m.

The distance from Bencoolen to Rimbo Pengadang along the main road is 110 km. The last-named place is situated

1. For the use of this name as applied to the entire chain of Islands *vide* Oberholser Smithsonian Misc. Coll. 60, No. 7, 1912, p. 1. We have for smaller places named followed Dutch methods of spelling; for better known places, as Bencoolen, we have adopted the English usage.

at about 1,000 m. on one of the slopes of the Barisan Mountain-range. Here I stayed from 7th to 29th June. In the jungle around the resthouse the traps and snares were put up and shooting was done in the vicinity, even as far as Tapus (800 m.).

On the 29th June I went by motor to Suban Ajam, a coffee-estate on the north side of the Bukit Kaba (altitude 1,000 m.) About 4 km. from the estate I pitched a camp on the 5th July in very dense primaeval forest at 1,200 m. Besides the animals shot by the native hunters and the rats caught in wire-traps, we got a number of birds and mammals in our snares, of which I had about 300 set up in a long fence running for a mile through the jungle. An ascent of the Kaba Volcano had to be given up on account of bad weather and the incessant rains compelled me to leave the camp on the 17th July. As I wanted to go by motor to Palembang and visit the Gunung Dempo, I had to forward part of my collections *via* Bencoolen to Java and to arrange for a big freight-motorcar. All these preparations took a week, for I had to go to Kepahiang and Bencoolen. During this time my men collected on estates. On the 24th July I left Suban Ajam, travelling by way of Muara Bliti, Tebing Tinggi, and Lahat to Pagar Alam and thence to Pasumah Estate, a journey which took three days. Pasumah Estate is a coffee-plantation on the lower slopes of the Gunung Dempo at about 1,000 m.

I lost another week looking for a camping-place up the mountain, for at first we could not find a suitable spot to pitch our camp. Either there was no water at all, or the ravines were too steep. At last I found a tolerably good place two hours walking from the estate at a height of 1,400 m.

I had a camp built and we stopped there from the 2nd till the 26th August. Here, too, we had very bad weather all the time. As before a fence with 300 snares was put up, but the result was very poor. On the 22nd August I moved to a temporary camp up the slope of the mountain at 1,800 m. From there an ascent was made of the Dempo which is 3,150 m. high. I encountered such bad weather that I had to turn back 50 m. below the summit on the same day.

After a great deal of discomfort I had to return to the 1,400 m. camp on the 24th August and two days later to the estate. There some collecting was done in the young forest below the estate at 900 m.

I left on the 5th Sept. for Palembang and from there returned to Java. Altogether 786 birds, 216 mammals, some reptiles, amphibia, fishes and molluscs were collected, besides a large number of insects and a very fine collection of living and dried plants. The results would have been better had I not encountered such abnormally bad weather; the quantity of rain was nearly twice the usual amount during this time of the year.

One of my cases with skins was stolen on my arrival at Batavia. A small number of living animals was brought over to Java, of which the most remarkable is a living specimen of the rare *Nesolagus netscheri* which, after 4 months of captivity, is still alive and in excellent condition.

1. *Pithecus melalophos melalophos* (Raffles).

Simia melalophos Raffles, Trans. Linn. Soc., xiii, p. 245 (1821).

Pithecus melalophos melalophos Robinson and Kloss, Journ. F.M.S. Mus., VIII, Pt. II, p. 4 (1918).

1 ♂ ad. Rimbo Pengadang, Lebong, Bencoolen, 3,300 feet, 8th June 1916 [No. E. J. 23].

From the examination of a large series of this monkey from one district (Korinchi) we have come to the conclusion that it is impossible to recognise more than one race of rufous monkey in the southern half of Sumatra and that the names *flavimanus*, Is. Geoffr., and *nobilis* Gray, must be relegated to the synonymy of Raffles' form.

The example obtained is not very brightly coloured and is without any traces of black on the hands and feet.

Collector's external measurements.—head and body, 403; tail, 665; hindfoot, 174; ear, 29 mm.

Skull.—Greatest length, 96; basal length, 67; zygomatic breadth, 75.5; length of maxillary tooth-row excluding incisors, 32 mm.

2. *Tarsius bancanus*, Horsf.

Lemur tarsier Raffles, Trans. Linn. Soc., xiii, 1821, p. 337 (Sumatra).

Tarsius bancanus Horsfield, Zool. Res. in Java, 1824, with plate and figure of teeth (Banka); Vigors in Memoir of Sir T. S. Raffles, 1830, p. 643 (Java); Elliot, Review of the Primates, I, 1913, p. 14 (Java).

Tarsius spectrum? Vigors in Memoir, etc., p. 643 (Sumatra); Horsfield, Cat. Mamm. East Ind. Mus., 1851, p. 25 (Banka).

1 ♀. Kaba Volcano, 600 m. Bencoolen [No. E. J. 215].

Horsfield in the Zoological Researches writes of his type "I obtained this animal in Banka, near Jeboos, one of the mining districts" though later in the "Memoirs" Vigors gives Java as the locality for *bancanus*. The latter reference probably mislead Elliot into stating of *bancanus* "Type locality Banca, near Jeboos, Java" for otherwise we hope he would not have ventured to describe the animal from Billiton Island, so near to Banka, as distinct from a species which rests on one obviously juvenile individual collected ninety years previously. The state of ignorance with regard to *T. bancanus*

is so great that we cannot say whether *T. saltator* of Billiton¹ has any claim to special recognition, or whether the Sumatran animal is different. We therefore list it for the present as *Tarsius bancanus*, for if *tarsier* Erxl., and *spectrum* Pall., are indeterminable, (as Elliot considers), it is the first name applicable to any particular Malaysian animal.

The present example is apparently adult; it has been skinned from spirit after a few months immersion and unfortunately the whole of the fur round the middle body has slipped.

Throughout, the base of the pelage is a grey of various tones, palest on the underside of the limbs and abdomen and this colour always modifies the general hue: most of the hairs of the upper parts are faintly tipped with black.

Upper parts.—Muzzle and a ring round the eyes tawny; head, neck, shoulders and forelimbs dull ochraceous-buff brightest on the face and forearms, almost absent on the upper arms, which are albescent, and becoming fainter behind the shoulders: the mingling of three colours on the occiput and nape produces an almost isabelline effect. Rump and hind-limbs ivory yellow, the rump rather whitish, the outer sides of the thighs and the knees suffused with ochraceous-buff; metapodials of hands white, of feet ochraceous-buff.

Underparts.—Chin, throat and chest thinly haired, grey washed with ochraceous; forelimbs whitish tinged with ochraceous; genital region and the backs of the thighs ivory-white; hairs of inner sides of hind-limbs grey tipped with whitish.

Tail.—Base thickly clad with fur for 30-35 mm. greyish ivory-white, of pure colour below; rest of tail nearly naked except the last 60 mm. which is clad with hair becoming longer towards the tip, dull buffy at base, brown distally.

Digits practically naked. Ears with a few ochraceous hairs on the conch, the backs more thickly clad and coloured like the occiput.

Skull and teeth.—As compared with those of *T. fuscus* of Celebes figured by Elliot (tom. cit. Pl. II,) these differ in having the bony orbits with a deep emargination on the external edge of the orbit above the anterior root of the zygomatic arch; the cranium considerably smaller; nasals much shorter; the anterior nares narrower and more diamond-shaped with the apex truncate; bullae very dilated anteriorly with a constriction on the inner side at a point about three-fifths of their length. Outer upper incisors very small with a considerable space separating them from the canines; *pm*¹ much smaller and situated just inside a line joining the cusps of *c* and *pm*². Condyles of mandible longer than broad.

¹ Elliot, Bull. Amer. Mus. Nat. Hist., 1910, p. 152.

Measurements.—Total length, 335 (361¹); tail, 225 (228); hind-foot, 69 (68); ear, 26; tibia, 62; femur, 61; forearm 41.5; humerus, 28. **Skull:**—greatest length, 38.2 (37.0); occipito-nasal length, 37 (35); front of *pmx* to front of foramen-magnum, 27.1; front of *pmx* to posterior extremity of palate, 16.2; least breadth between *m3-m3* internally, 9.5 (9.0); greatest length of bullae diagonally, 13.0; median length of nasals, 5.8 (4.8); greatest biorbital breadth between emarginations, 29.0; greatest cranial breadth, 23.2; greatest length of upper molar series, 12.2 (15.1²); greatest length of lower molar series, 12.7 (12.5); length of mandible, 25.4 (24.1)

Remarks.—A Tarsier from Sarawak, Borneo, also a female, exactly resembles this specimen in colour and shows that the mid-body above is tinged with ochraceous and blends equally with the shoulders and rump: below it is neutral grey slightly tinged with buffy anteriorly and visibly margined from the colour of the sides, the grey extending down the inner side of the thighs.

The Sumatran skull is intermediate in size between the above Bornean female and a Bornean male, and the only character that appears to support a claim to even subspecific distinction for the latter is that in it *pm*¹ is a little larger and is situated in the median line of the tooth row.

3. *Felis marmorata* Martin.

Felis marmorata, Martin, P.Z.S., 1836, p. 104; Schneider Zool. Jahrb. Jena, xxiii, p. 102 1905.

1 ♀ subad. Pasumah Estate (Pasumah), Palembang, 3000 feet, 3rd September, 1916 [No E.J. 214]

The animal on which this species is based was said to have come from "Java or Sumatra." The marbled cat is rare in collections from the Malaysian region, probably more because of arboreal, nocturnal habits than real scarcity. It does not appear to have been definitely recorded from Java and we therefore select Sumatra as the type locality.

The reticulations are scarcely traceable in the present specimen but the character is a very variable one and does not appear to depend on sex, age or locality.

Collector's external measurements: head and body, 452; tail, 483; hindfoot, 121; ear, 43. **Skull:**—greatest length, 88; basal length, 72; palatal length, 32; upper tooth-row excluding incisors (alveoli) 28.2; least palatal breadth between sectorials, 23.1; interorbital breadth, 14; zygomatic breadth, 63 mm.

1. Measurements in parentheses those of the type of *T. saltator* of Billiton Id.

2. Misprint?, Probably 12.1 or 13.1.

4. *Felis bengalensis sumatrana* Horsf.

Felis sumatrana, Horsfield, Zool. Res. in Java (1824) with plate; Lyon, Proc. U.S. Nat. Mus., xxxiv, p. 658 (1908).

Felis minuta, Temminck, Mon. Mamm. p. 130 (1827) [Java and Sumatra]

1 ♀ subad., Tapus, Lebong, Bencoolen, W. Sumatra, 2,700 feet, 25 July, 1916. [No E.J. 70.]

A very rufous example. Lyon has identified a greyish male from Aru Bay, E. Sumatra, as *F. bengalensis* and described "not without much hesitation" a small bright-coloured female from Tebing Tinggi Id., East Coast of Sumatra, as new with the name of *Felis tingia* (loc. cit. supra.).

The spots on the sides of the present specimen are elongate and not very distinct or blackened; and the upper side of the tail, of a brilliant tawny colour, is by far the brightest part of the pelage: on the underparts the spots are also small and many of them obscure. The orbits are incomplete.

This Sumatran animal differs from Malayan specimens which probably represent typical *bengalensis* in having the markings much reduced everywhere, most notably on the white underparts: those on the back and sides are more oblong and angular, less rounded. It is not more brightly coloured than the brightest Malayan example in a series of six except on the upper side of the tail where the dark markings are also smaller.

The Bornean form *F. b. undata* Desmarest, is rather more tawny than the Sumatran and has the dark markings larger and more distinct but noticeably fewer. It is a much brighter but less heavily marked animal than the Malayan race.

Collector's external measurements:—head and body, 462; tail, 213; hindfoot, 106; ear, 39. Skull:—greatest length, 90; basal length, 76; palatal length, 35.5; zygomatic breadth, 55; post-orbital constriction, 25.5; width of cranium above roots of zygomata, 37.6; greatest length of bulla, 19.2; alveolar length of last three maxillary teeth, 17.1; alveolar length of last three mandibular teeth, 19.7 mm.

5 *Paguma larvata leucomystax* (Gray).

Paradoxurus leucomystax, Gray, P. Z. S., 1836, p. 88.

? *Paradoxurus rubidus*, Blyth, Journ. Asiat. Soc. Bengal, xxvii, p. 275 (1858).

Paguma larvata leucomystax, Robinson & Kloss, Journ. F. M. S. Mus., viii, Pt. I, p. 10 (1918); iid., antea, p. 243.

1 ♂ ad. Air Njuruk (Pasumah), Palembang, 20th Aug., 1916. [No. E. J. 196.]

A fine adult animal with a pronounced sagittal crest and worn teeth. Top and sides of muzzle, forehead and throat dull brownish white. Area from above eye to below ear, including the outer side of the base of the latter, with terminal

third of tail, buffy white. Remainder of upper parts and tail with limbs blackish brown, the sides rather lighter and brighter and annulated with ochraceous. Underparts paler, many of the hairs of the abdomen ochraceous; a patch of buff white hair surrounding the genitals.

Collector's external measurements:—Head and body, 568; tail, 550; hind-foot, 105; ear, 44. *Skull*:—greatest length, 134; condylo-basal length, 131; basal length, 124; palatal length, 64.4; greatest diameter of pm4 , 10.0; interorbital breadth, 25.8; postorbital breadth, 20.0, mastoid breadth, 48; zygomatic breadth, 76.3.

Mr. Jacobson says of this animal "It is called by the natives round the Dempu "seriu." It is said to be very fond of stealing house-cats. In my 1400-metre camp on the Gunung Dempu I once watched one of these animals moving in the forest along the tops of the lower trees at a very fast rate; it was probably the same specimen that devoured every night all the game we caught in our snares till at last I succeeded in trapping it in a big steel trap."

6 *Prionodon linsang* (Hardwicke).

Viverra? linsang, Hardwicke, Trans. Linn. Soc. xiii, 1821, p. 236, pl. 24.

Prionodon gracilis, Cantor, Journ. Asiat. Soc. Bengal, xv, 1846, p. 199 (Malacca).

Prionodon maculosus, Blanford, Proc. Asiat. Soc. Bengal 1878, p. 93; id. Journ. Asiat. Soc. Bengal, xlvii, pt. 2, 1878, p. 152, pl. vi, vii, (Tenasserim); Kloss, Journ. Straits Branch. Roy. Asiat. Soc., No 53, 1909, p. 21 (Malay Peninsula and Sumatra).

Linsang linsang, Lyon, Proc. U.S. Nat. Mus., xxxiv, 1908, p. 657 (Sumatra).

1 ♂ ad. Suban Ajam (Redjang) Bencoolen, 8th July, 1916. [No E. J. 87.]

We cannot find any differences between Malayan and Sumatran examples of this rare carnivore and, allowing for the individual variation which must be considered, Blanford's figure and description of the Tenasserim animals he called *maculosus* perfectly apply to southern individuals, except that the former is figured with a yellower head and tail; which features, however, are not borne out by the description. It seems unwise to accept geographical races until fair series from various localities can be compared; and in dealing with them it would be necessary to remember that the colour of the pelage of specimens degrades with age, the blackish marks turning brown and the pale buffy ground colour becoming distinctly deeper in tone.

In case there should be considered any doubt existing as to the provenance of Hardwicke's animal we cite Malacca as the type locality and the specimen collected by Farquhar as the type. The Javan form, *Prionodon linsang gracilis* (Horsfield)¹ appears to differ in being smaller and in having the dark markings considerably reduced in size.

Blanford (Faun. Brit. Ind. Mammals, p. 102) states that the posterior upper molar of *Viverra* is wanting in this genus—and it is not figured as present by Horsfield in *gracilis* of Java—but this is apparently not the case for *m*² is present in the Sumatran specimen though it is small (greatest diameter about 1 mm). It is doubtless generally lost at an early age—a fact that has not hitherto been discovered as very few individuals have been examined. The dental formula really is therefore:—

$$\text{I. } \frac{6}{6} \text{ C. } \frac{1}{1} \text{ pm. } \frac{4-4}{4-4} \text{ m. } \frac{2-2}{2-2}$$

Collectors, external measurements of the Suban Ajam specimen:—Head and body, 415 (397);² tail, 350 (381); hindfoot, 66 (67); ear, 28. 5. Skull:—greatest median length, 75 (71); basal length, 69 (67.2) breadth of palate at *pm*⁴ (alveoli), 13.2 (13.0); least interorbital breadth, 13 (13.5); cranial breadth above roots of zygomata, 25 (24.2); mastoid breadth, 21.7 (21.7); zygomatic breadth, 35.5 (36.2) *c-m*¹ (alveoli), 26 (26.6); *c-m*² (alveoli), 27 (28).

7 *Arctonyx collaris hoeveni* (Pl. V, fig. 1).

Trichomanis hoeveni Hubrecht, Notes Leyden Museum, xii, p. 241 (1891)

Arctonyx collaris Hubrecht (nec Cuv.) P.Z.S., 1895, p. 522

Arctonyx hoeveni Schneider, Zool. Jahrb. Jena, xxiii, p. 91 (1905).

Arctonyx collaris hoeveni Robinson & Kloss, Journ. F.M.S. Mus., VIII, Part II, p. 11, pl. 1 (1918)

1 ♀ Suban Ajam, Kaba Volcano, 4,000 feet, (Redjang) Bencoolen, 16 July 1916. [E. J. No 116.]

No measurements have been taken and the skin is not accompanied by a skull.

Top of muzzle, upper sides of the ears, a small patch below the eyes, throat and foreneck with lower sides of neck and the distal half of tail creamy white; remaining pelage black except on the posterior half of back and sides, the hind legs externally and the basal half of the tail where the hair is tipped with whitish; the bases of the hairs on the nape,

1 Zoological Researches in Java (1824) plate and figures.

2 Measurements in parentheses those of a female from Perak, F.M.S. Mus. No 122/14.

back and sides are dull whitish. The claws are whitish horn-coloured and are very much longer on the fore than on the hind feet.

Of this example Mr. Jacobson writes "I kept this specimen alive for a day; the only food it would take was earthworms; raw meat and insects were refused. The excrement, consisting chiefly of earth from the worms it had digested, had a very nauseous, sweetish smell, very characteristic and quite different from the pungent smell of *Mydaus meliceps*. The animal is of very savage disposition; if excited it emits a grunting sound, exactly as if somebody was snoring, and not the rumbling or drumming sound which is peculiar to other badgers, as for instance, *Mydaus*. The animal was captured in a snare; its mate was caught the next day on the same spot but escaped by tearing the string. On the Gunung Dempo I saw at an altitude of 1800-2600 metres numerous traces of this badger; everywhere the soil was turned up for worms and I found there also its not-to-be-mistaken excrement."

8. *Tupaia glis jacki* Robinson and Kloss.

Tupaia glis jacki Robinson and Kloss, Journ. Fed. Malay States Mus. VIII, Part 2, p. 15 (1918).

1 ♂ ad. Rimbo Pengadang, Barisan Range, W. Sumatra, 1000 m., 15th June 1916. [No. E.J. 50.]

1 ♀ imm. Suban Ajam, Kaba Volcano, W. Sumatra, 1,200 m. 18 July 1916 [No. E.J. 121.]

Quite identical with the types.

9 *Tupaia javanica occidentalis* Robinson and Kloss.

Tupaia javanica occidentalis Robinson and Kloss, Journ. Fed. Malay States Mus., VIII, part 2, p. 16 (1918).

2 ♂ ad. 1 ♀ imm. Suban Ajam, Kaba Volcano, West Sumatra, 1000-1,200 m. (3280-3940 feet), 1st July 1916. [No. E.J. 79, 80, 127.]

1 ♂ 1 ♀ ad. Gunung Dempo, Palembang, West Sumatra, 1,400-2,000 m. 9-23rd August 1916. [Nos. E.J. 158, 203.]

1 ♂ ad. 1 ♂ imm. Pasumah Estate, Gunung Dempo, Palembang, W. Sumatra, 900 m. 28th August 1916. [Nos. E.J. 209-10.]

These specimens agree well with the types.

10. *Tupaia minor humeralis*, subsp. nov.

Tupaia minor subsp. Robinson and Kloss, Journ. F.M.S. Mus., VIII, pt. II, p. 17 (1918).

Type: Adult female (skin and skull) collected at Rimbo Pengadang, Barisan Range, Bencoolen, West Sumatra, 1,000 m. on June 26th, 1916, by E. Jacobson. [Original No. E.J. 72].

Diagnosis: Intermediate between *T. minor minor* Günther, from Borneo and *T. minor malaccana* Anderson, from the southern half of the Malay Peninsula.

From the former distinguished by its more olivaceous undersurface less clearly defined from the flanks, the upper surface less washed with rufescent: and from the latter by the longer whiter neck stripes and by the dark colour of the tail. Size as in *T. m. minor*¹ and *T. m. malaccana*²: not so large as *T. m. sincipis*³.

Specimens examined:

1 ♂, 1 ♀ Bencoolen Town, West Sumatra. 30th May—4th June 1916. [Nos E.J. 1, 13].

2 ♀. Rimbo Pengadang, Barisan Range, West Sumatra, 1000 m. (3,280 feet), 11th—26th June 1916, [Nos. E. J. 30, 72].

(For detailed measurements see table on p. 282.)

Mr. Jacobson states that this species (which is known in Sumatra as *tupa akar*) as well as *T. j. occidentalis*, is more arboreal than the other species of Tupaiidae occurring in the island: the same fact has been noted by other observers.

11. *Tana tana tana* (Raffles).

Tupaia tana, Raffles Trans. Linn. Soc. XIII, p. 257 (1821.)

Tana tana tana Robinson & Kloss, Journ. F.M.S. Mus. VIII, pt. II, p. 17 (1918.)

2 ♂ ad. 1 ♂. imm. Rimbo Pengadang, Barisan Range, Bencoolen, W. Sumatra, 1000 m. (3,280 feet). [Nos E. J. 64, 66, 73].

1 ♂ ad. Suban Ajam, Kaba Volcano, West Sumatra, 1000 m. (3280 feet), 30th June 1916. [No. E. J. 76].

5 ♂ ad., 3 ♀ ad., 1 ♀ imm. Ditto, 1200 m. (3930 feet). 2nd—17th July [Nos. E. 382—85, 91, 99, 100, 106, 107].

2 ♂ ad. Gunung Dempo, Palembang, W. Sumatra, 1,400 m. (4600 feet), 8—9th August 1916. [Nos. E J. 155, 160].

1 ♀ ad. Ditto, 1,900 m. (6150 feet), 23rd August, 1916. [No. E. 2. J. 201].

This large series is on the whole very uniform; variation in the adult animals being principally in the extent of the black shining patch on the rump, the extent of the paler speckled areas on each side of the median black stripe and in the tint of the undersurface, which is very decidedly darker in the specimens from the Dempo than in those from Rimbo Pengadang which may be regarded as topotypes of Raffles species.

¹ Günther, P. Z. S. 1876 p. 426.

² Anderson Anat and Zool Res. p. 134. pl. 7, fig 16 (1878).

³ Lyon, Proc. Biol. Soc. Washington, 24, p. 169 (1911).

The immature animals are much duller in general tint, with the black rump patch rather less conspicuous.

Mr. Jacobson notes this species as very common on the Barisan, Kaba and Dempo mountains, living on the ground and in low shrubs.

(For detailed measurements see table on page 282.)

12. *Gymnura gymnura gymnura* (Raffles)

Viverra gymnura, Raffles, Trans. Linn. Soc. xiii, p. 272 (1821).

Gymnura rafflesii, Lesson, Man. Mamm., p. 171 (May, 1827); Horsf. & Vig., Zool. Journ., III, p. 248, pl. viii (Oct. 1827).

Gymnura gymnura, Schneider Zool. Jahrb. Jena xxiii, p. 89 (1905).

Gymnura gymnura gymnura, Lyon., Proc. U.S. Nat. Mus., xxxvi, p. 451, pl. 34, fig. 3 and 35, fig. 2 (1909).

1 ♂ ad. 1 ♀ ad. Rimbo Pengadang, Lebong, Bencoolen. 18th-30th June, 1916. [Nos. E. J. 77, 57].

Collector's external measurements:—Head and body, 370, 329; tail, 300, 240; hindfoot, 65, 57; ear, 27, 25.

Skulls:—Basal length, 77, 70; palatal length, 50, 46; upper toothrow, all teeth (alveoli), 44.0, 41.4; zygomatic breadth, 39, 35; mandible, front of symphysis to back of condyle, 63, 56; mandibular tooth-row, all teeth (alveoli), 38.5, 35.0.

Lyon (l. c. s.) from the examination of, for this species, a large series (8 from Sumatra, 6 from the Malay Peninsula) has concluded that two races of *Gymnura* exist in those regions:—the typical form occurring in Sumatra and the extreme south of the Peninsula, and a second race, *G. g. minor*, in more northern localities.

They are said to be distinguished by differences in size, the hind-foot² of *gymnura* being more than 60 mm. and basal length of skull more than 70 mm.; while of *minor* the hindfoot is less than 60 mm. and the basal length less than 72 mm.

The measurements of the present female, though it is fully adult, show that these distinctions cannot be strictly maintained.

The following are measurements of some *Gymnura* from the Malay Peninsula:—

| | |
|--------------------------|-------------------------|
| Hindfoot, s.u. Selangor. | ♂ ♂ 57 mm. ² |
| Patani. | ♂ 57 mm. ¹ |
| South Tenasserim. | ♂ 62 mm. ² |

1. Measured on dried skins.

2. Measured in the flesh.

Basal length of skull. Selangor. ♂♂ 74.5, 73 mm.

„ ♀ 73

„, sex. inc. 74

Perak ♂ 70.5

Patani ♂ 75

South Tenasserim ♂ 69.

Only the Perak and Tenasserim examples are not fully adult.

No doubt the Sumatran animals are larger than those of the north but a more obvious difference than that of size has been overlooked by Lyon. "The Southern form has the white-tipped hairs of the pelage extending over more than three-fourths of the length of head and body with the whitened area ending broadly across the rump, so that viewed from below numerous white tips are visible; the northern race has the white-tipped hairs extending over less than two-thirds of the length of head and body with the whitened area ending in a point on the back and not spreading over the sides, so that viewed from below no white tips cannot be seen. Also in the latter the white terminal portion of the tail is generally smaller." (Kloss, Journ. Nat. Hist. Soc. Siam. (1917) II, p. 298).

Lyon has recorded a specimen with a basal length of skull of 78.5 mm. from the Rumpin River, South Pahang, as *G. g. gymnura* but before accepting this identification we should like details of the colour; where only small series of an animal have been examined, as in this case, we probably do not yet rightly know the local limits of size.

Mr. Jacobson notes: "this animal is apparently nocturnal and sleeps during the greatest part of the day: has a very poor sight. Smell very obnoxious and pungent. Food: insects and their larvae, worms, raw meat. Is said by the natives to eat sugarcane, which it never did in captivity; took when in confinement a great quantity of water. Liked very much to bathe in the watertank of his cage; has an exceedingly fierce and savage character. Native name in Lebong (Bencoolen), "Ileus."

Colour of nose pink; the ♀ with 3 pairs of mammae.

Mr. Jacobson sends sketches of the nose of this animal: they show a curious dentate leaf-like expansion or wing extending backwards beneath the nostril from its anterior base and then curving upwards towards the top of the rostrum.

18 *Cynopterus* sp.

1 ♂ subad. Pasumah Estate (Dempo 900 m), Pasumah, Palembang. [No. E.] 212.]

Indeterminable: may be either *C. brachyotis* or *C. angulatus*.

14 *Pipistrellus tralatitius* (Horsf.)

Vespertilio tralatitius Horsf., Zool. Res. in Java (1824).

Pipistrellus tralatitius Thomas in Robinson & Kloss, Journ. F.M.S. Mus. VIII, Pt. II, p. 28 (1918).

1 ♂. Muara Enim, Palembang, [No. E. J. 217.] 25th July 1916.

15 *Petaurista petaurista batuana* Miller.

Petaurista batuana Miller, Smithsonian Misc. Collections, Vol. 45, p. 23, pl. II, fig 3 (1903); Lyon, Proc. U. S. Nat. Mus. Vol. 34, p. 634 (1908). [Batu Islands, West Coast of Sumatra].

Petaurista nitida marchio Thomas, Ann. & Mag. Nat. Hist. (8), I, p. 251 (1908). Western Sumatra.

Petaurista petaurista marchio Robinson & Kloss, Journ. F.M.S. Mus. VIII, pt. II, p. 28 (1918).

1 ♂ ad. Rimbo Pengadang (Lebong) Bencoolen, 2nd June 1916 [No. E. J. 34].

Since we last wrote on this Flying-squirrel (*l. c. s.*) we have received a letter from Mr. G. S. Miller which seems to confirm Dr. Lyon's opinion (*l. c. s.*) that the Batu Island and Sumatran animals are indistinguishable. Mr. Miller says: "About the ears of *Petaurista batuana*:—the black is confined to the metectote. In the type the hairs of this region are so long that in the dried ear the whole outside appears to be black. On smoothing it out the true condition becomes evident—also my error in describing."

Collectors external measurements:—Head and body, 408; tail, 460; hind-foot, 74; ear, 45.

Skull.—Greatest length, 67.3; condylo-basilar length 59; diastema, 14; alveolar length of upper tooth-row, 16.2; palatilar length, 31; median length of nasals, 20; combined breadth of nasals, 12; zygomatic breadth, 45.0 mm.

16 *Ratufa bicolor palliata* Miller.

Ratufa palliata Miller, Proc. Acad. Nat. Sci. Phil., LIV, p. 147 (1902).

Ratufa bicolor palliata Robinson & Kloss, Journ. F.M.S. Mus., pt. II, p. 29 (1918).

1 ♂ ad. Suban Ayam (Redjang), Bencoolen, 10th July 1916. [No. E. J. 90].

1 ♂ ad. Air Njuruk (Pasumah), Palembang, 9th Aug. 1916. [No. E. J. 161].

This blackish-brown and buff giant squirrel is the most widely distributed species of the genus occurring in Sumatra. The type came from the navigable reaches of the Indragiri River and the form does not seem to vary at all throughout its range.

Collector's external measurements:—Head and body, 368, 366; tail, 440, 432; hind-foot, 79, 76; ear, 27.5, 28.

Skulls.—Greatest length, 72, 69.8; condylo-basilar length, 60, 60.8; palatilar length 27.2, 28; diastema, 15.8, 16; upper molar-row (alveoli) 14.2, 14; interorbital breadth, 28, 29; zygomatic breadth, 48, 46.

17. *Callosciurus vittatus vittatus* (Raffles).

Sciurus vittatus, Raffles, Trans. Linn. Soc. XIII, p. 259 (1821).

Callosciurus vittatus vittatus, Robinson & Kloss, Journ. F.M.S. Mus. viii, Pt. II, p. 30 (1918).

3 ♂ ad., 1 ♂ subad. 5 ♀ ad., 1 ♀ subad. Bencoolen Town, W. Sumatra, 5 m. (16 feet,) 30th May— th June, 1916. [Nos. E. J. 2, 3, 5-12.]

2. ♀ ad. Rimbo Pengadang, Barisan Range, W. Sumatra, 1000 m. (3,280 feet), 11th-14th July, 1916. [No. 33, 46.]

1 ♀ ad. Gunung Dempo, Palembang, W. Sumatra, 1,400 m. (4,600 feet). 8th August, 1916. [No. E. J. 150.]

The specimens from Bencoolen are absolute topotypes of the true *Sciurus vittatus* of Raffles, regarding which there has been much confusion. There is a certain amount of variation in the series in the colour of the belly which is ochreous fulvescent in the majority though four specimens have a distinct tinge of tawny ferruginous. None of them have a clear red pencil to the tail though in some there is a strong tint of this colour. In all, the inner black lateral stripe is more or less sullied by having the hairs on the inner side narrowly tipped with the colour of the belly.

One of the two specimens from Rimbo Pengadang is strongly rufescent beneath while the single female from the Dempo is possibly not strictly identical with the rest, having the lateral black stripe rather broader and clearer, the colour beneath rich tawny rufescent and the tail strongly suffused with the same colour. Not improbably it is identical with the form from the Kateman and Indragiri R. in S. E. Sumatra, which Dr. Lyon (Smithsonian Misc. Collections, Vol. 48, (1907), p. 279) regards as *Sc. vittatus peninsularis*, Miller, originally described from the Endau River, North Johore, but which should perhaps receive a separate name.

18. *Callosciurus nigrovittatus bocki* (Robinson & Wroughton).

Sciurus nigrovittatus bocki, Robinson & Wroughton, Journ. Fed. Malay States Mus. IV, p. 167 (1911).

Callosciurus nigrovittatus bocki, Robinson and Kloss, Journ. F. M. S. Mus. VIII, pt. II, p. 31 (1918).

1. ♀ imm. Kepahiang, Bencoolen, W. Sumatra, 500 m. (1,600 feet,) 7th June, 1916. [No. E. J. 15].

5 ♂ ad., 1 ♂ imm., 6 ♀ ad., 2 ♀ subad. Rimbo Pengadang, Barisan Range, W. Sumatra, 1,000 m. (3,280 feet), 7th-20th June, 1916. [Nos. E. J. 16, 25, 26, 31, 32, 36, 38, 43, 44, 51, 52, 54, 55, 58, 63.]

1 ♀ subad. 1 ♀ imm. suban Ajam, Kaba Volcano, W. Sumatra, 1,200 m. (3,950 feet), 3rd-7th July, 1916. [Nos. E. J. 81, 86.]

1 ♂ ad., 1 ♂ subad. 1 ♀ ad. 1 ♀ imm. Gunung Dempo, Palembang, W. Sumatra, 1,400 m. (4,600 feet), 7th-25th August, 1916. [Nos. 143, 159, 166, 204.]

Mr. Jacobson states that this squirrel occurs from sea-level to 1,600 metres.

This race is not very strongly differentiated from the typical form inhabiting Java. It is slightly smaller with the grey of the undersurface lighter and with the whitish buff lateral side stripes much more distinctly marked. It is smaller and much duller coloured than either of the Peninsular races and lacks the rufous suffusion above of the Bornean races.

19. *Tomeutes lowi vanakeni* (Robinson & Kloss).

Sciurus vanakeni, Robinson & Kloss, Journ. Straits Branch Roy. Asiat. Soc. No. 73, p. 270 (1916).

Tomeutes lowi vanakeni, Robinson & Kloss, Journ. F.M.S. Mus. viii, pt. II, p. 32 (1918)

1 ♂ 1 ♀ ad. Gunong Dempo, Palembang, W. Sumatra, 1,400 m. (4,600 feet). 8th August, 1916. [Nos. E. J. 153, 54.]

Mr. Jacobson states that he only met with this species on the Dempo, where it was rare.

This pair can be matched with specimens from the typical series but has a larger amount of white on the belly (i.e. the white of the belly is less encroached on by the colour of the sides) than in the majority of the specimens. The race is easily separated from most other forms by the absence of a sharply defined line of division between the upper and lower parts. It is much smaller than the Bornean form, *T. lowi lowi* but requires comparison with *Sciurus humilis*¹, from the Kateman River, East Sumatra which is itself not improbably synonymous with *Sc. siemundi*², from the adjacent Island of Pulau Kundur.

For detailed measurements of this and allied races see table p. 285.

1. Miller Smithsonian Misc. Coll. vol. 61, p. 24, (1913)

2. Thos. & Wroughton Ann. & Mag. Nat. Hist. (8) iii, p. 449 (1909); id. *Ann. Fed. Malay States Mus.* iv, p. 117 (1909).

20. *Tomutes tenuis modestus* (Mueller).

Sciurus modestus, Mueller, Verhandelingen, Inleiding, p. 55 (1839-44).

Sciurus tenuis Jentink (part) Mus. d'Hist. Nat. Pays Bas, XII, pp. 21, 22 (1888); (?) Miller, Proc. U. S. Nat. Mus XXVI, p. 452 (1903).

Tomutes tenuis modestus, Robinson & Kloss, Journ. F. M. S. Mus. viii, pt. II, p. 33 (1918).

3 ♂ ad., 1 ♂ imm., 4 ♀. Rimbo Pengadang, Barisan Range, W. Sumatra, 1,000 m. (3,280 feet,) 8th-25th June, 1916. [Nos. E. J. 20, 21, 27, 42, 45, 59, 60.]

1 ♀ ad. Suban Ajam, Kaba Volcano, West Sumatra 1,200 m. (3,950 feet,) 11th July, 1916. [No. E. J. 98.]

Externally this series appears to differ from a series of topotypes of *T. tenuis tenuis* (Horsf.) from Singapore Id. by its colder olivaceous tone, the rufescent shoulder patches being much less in evidence. The under surface is clearer grey, less tinged with yellowish buff. The size however, also serves to separate it, as typical *tenuis* rarely if ever exceeds 37 mm in total length of skull and is generally about 36; while these, as the detailed measurements show, do not fall below 38 in adult animals. Other cranial dimensions, notably the upper molar row are also correspondingly increased.

The type of *Sc. modestus*, came from Mt. Singgalang in the Padang Highlands probably from about 4,000 feet, or a little higher. An adult from Sandaran Agong, Korinchi Valley, 2,450 feet, agrees well with Mr. Jacobson's series. In the absence of skull measurements it is impossible to say with certainty whether the specimens from Tapanuli bay, recorded by Miller (loc. cit. supra) belong to this or another race of *tenuis* but those from Eastern Sumatra listed by Lyon (Proc. U. S. Nat. Mus. xxxiv, p. 643) (1908), are, judging by the size, almost certainly identical with *T. tenuis tenuis*.

(For detailed measurements see table on p. 286).

21. *Tomeutes tenuis altitudinis* (Robinson & Kloss).

Sciurus tenuis altitudinis, Robinson & Kloss, Journ Straits Branch Roy. Asiat. Soc. No. 73, p. 269 (1916).

Tomeutes tenuis altitudinis, Robinson & Kloss, Journ. F. M. S. Mus., viii, pt. II, p. 34 (1918).

2 ♂, 2 ♀ ad. Gunung Dempo, Palembang, W. Sumatra, 1,400-2,200 m. (4,600-7,200 feet,) 8th-23rd August, 1916 [Nos. E. J. 151, 152, 167, 202.]

This very distinct race is based on a large series collected in various parts of the district of Korinchi at altitudes varying from 4,000-8,500 feet. The Dempo specimens agree with these but are perhaps even more yellowish above with the feet and hands with a stronger speckling of yellowish ochre.

Beneath, they do not in any way differ, being greyish strongly tinged with yellow. The race is by far the brightest of any with which we are acquainted, perhaps in this respect coming nearest to *T. t. tahan* (Bonh). from the mountains of the Malay Peninsula though much smaller than this form. The most striking character is the length and softness of the pelage and density of the woolly underfur, correlated of course with the altitudes at which the animal lives.

When compared with a series of the lower-ranging *S. t. modestus*, the differences in the skull are not very striking; the present species has it perhaps slightly longer with a slightly longer and slenderer rostrum, the nasals being somewhat pinched in posteriorly. The differences however are very indefinite, and can only be appreciated by direct comparison of considerable series.

22. *Lariscus insignis insignis* (Cuv.).

Sciurus insignis, F. Cuv. Mamm. p. 223 (1821).

Lariscus insignis insignis, Robinson & Kloss, Journ. F. M. S. Mus. viii, pt. II, p. 35 (1918).

1 ♀ ad. Rimbo Pengadang, Barisan Range, W. Sumatra, 1,000 m. (3,280 feet). 28th June, 1916. [No. E. J. 74.]

1 ♀ juv. Suban Ajam, Kaba Volcano, W. Sumatra, 1,200 m. (3,960 feet). 12th July, 1916. [No. E. J. 104.]

There has been a good deal of confusion regarding this Sumatran species, largely owing to its rarity in collections, though it was correctly described by Cuvier in the first instance.

The single specimen in the British Museum ascribed to Sumatra, though without any definite provenance, is a dull coloured animal without any marked rusty red tint on the undersurface and probably came from some part of the Malay Peninsula. The present form has its alliances rather with the Bornean form *L. i. diversus* (Thos). and is very distinct both from the Malayan and the Javan animals, though that from the Southern Malay Peninsula and Singapore *L. i. meridionalis*, Rob. & Kloss, is a connecting link between it and *L. i. jalorensis*, Bonhote.

23. *Lariscus niobe niobe* (Thos.).

Funambulus niobe, Thomas, Ann. & Mag. Nat. Hist. (7) II, p. 249 (1898).

Lariscus niobe niobe, Robinson & Kloss, Journ. F. M. S. Mus. viii, pt. II, p. 35 (1918).

1 ♂ 1 ♀ ad. Gunung Dempo, Palembang, W. Sumatra, 1,400 m. (4,600 feet). 6th-8th August, 1916. [Nos. E. J. 136, 149.]

A very distinct species separated from all the other mainland forms by its very dark colouration, undersurface dull yellowish buff mesially, not sharply differentiated from the sides. Skull with the bullae very small, the interorbital breadth relatively somewhat narrower than in other forms of the genus.

(For measurements see table on p. 287).

24. *Rhinosciurus laticaudatus saturatus*, subsp. nov.

Rhinosciurus laticaudatus, Schneider, Zool. Jahrb. Jena, XXIII, p. 107 (1905).

Diagnosis. Closely allied to *Rh. incultus* Lyon¹ from Pulau Tuanku but apparently even darker above, buffy tips to the hairs of the tail much reduced; undersurface not very strongly differentiated from the sides, tinged with yellowish buff, with ill defined yellowish-buff hip-patches.

Type:—Adult female (skin and skull) No. E. J. 65. Collected at Rimbo Pengadang, Barisan Range, West Sumatra, 1,000 m. (3,280 feet), on 22nd July, 1916, by E. Jacobson.

Skull. The skull exhibits no material differences from that of the other forms of the genus with which we have compared it. The bullae are as long though much less globose and smaller than those of *R. l. leo*, Thos. and Wr. from Singapore and about the same size as *R. tupaoides*. The muzzle is somewhat broader than any.

For measurements see table on p. 287.

Additional cranial measurements of type. Bullæ maximum length, 12.0 (12.0 mm)²; length of muzzle from lachrymal notch to tips of nasals, 27.1 (27.2); maximum breadth of combined nasals, 6.2 (5.9); minimum breadth of ditto. 4.1 (3.8.)

Specimens examined:—The type and a second female from the same locality.

Remarks:—Working on descriptions alone, this form is with difficulty separated from *R. l. incultus* though it can readily be distinguished from all the other forms. In view of the insular habitat of Dr. Lyon's species however, we have no doubt that the separation is justified.

"Food consists of termites" (E. J.)

25. *Nannosciurus melanotis sumatranus*. (Muell. & Schleg.).

Sciurus melanotis, Mueller & Schlegel (partim) Temminck's Verhandelingen, Zoologie, p. 98, pl. 14, fig. 5 (1839-44).

Nannosciurus sumatranus, Lyon, Proc. Biol. Soc. Washington XIX, p. 53 (1906).

1. Proc. U. S. Nat. Mus. 52, p. 444 (1916)

2. Measurements in parentheses those of an adult male. *Rh. l. leo* Thos. & Wroughton, from Changi, Singapore Island. F. M. S. Mus. No. 377/12.

1 ♂ ad., 1 ♀ ad. Rimbo Pengadang, Lebong, Bencoolen [Nos. E. J. 47 and 28.]

1 ♀ in spirit. Suban Ajam, Bukit Kaba Volcano, Bencoolen, 1,000 metres [No. E. J. 78.]

Body and limbs greyer and tail more hoary than as shown in Mueller and Schlegel's figure; muzzle with a distinct line of black above the white cheeks and cheeks below the band less blackened than as figured. The brightest portion of the upper surface is the front of the head which is ochraceous, less grizzled with black than the body. Nape rather greyer than figured.

Collectors external measurements: head and body, 80, 83, 85; tail, 70, 77, —; hindfoot, 21, 21, 22; ear, 11, 11, 11.

Skull of the male (No. 47): condylo-basilar length, 20 basilar length, 18.2; palatilar length, 9.7; diastema, 5; upper molar-row (alveoli) 3.8; median length of nasals, 8.1; greatest breadth, of nasals, 3.2; interorbital breadth 9.3; external biorbital breadth, 15.3.

26. *Rattus sabanus ululans* (Robinson & Kloss).

Epimys ululans, Robinson & Kloss, Journ. Straits Branch Roy. Asiat. Soc. No. 73, p. 272, July, 1916. (Korinchi, W. Sumatra).

Rattus sabanus ululans, Robinson & Kloss, Journ. F. M. S. Mus. viii, pt. II, p. 43 (1918).

2 ♂ ad. Rimbo, Pengadang, Barisan Range, W. Sumatra. 1,000 m. (3,280 feet), 11th-13th June, 1916. [Nos. E. J. 29; 39.]

1 ♂ ad. Suban Ajam, Kaba Volcano, W. Sumatra, 1,200 m., 8th July, 1916. [No. E. J. 97.]

1 ♂, 2 ♀ ad. Gunung Dempo, Palembang, W. Sumatra, 1,400 m., 6th-16th August, 1916. [Nos. E. J. 137, 189, 190]

1 ♀ ad. Gunung Dempo, Palembang, W. Sumatra, 900 m., 30th August, 1916. [No. E. J. 213.]

Mr. Jacobson records these as all trapped in heavy jungle.

We separated this race from the Malayan *vociferans* on one specimen only which, though adult, was less so than any of the present series.

When compared with a series of topotypes of that race the present form is seen to be duller and less cinnamonous.

Mus fromens, [Miller, Proc. Acad. Nat. Sci. Philadelphia LIV, p. 155 (1902). Typical locality Singkep Id., E. Coast, Sumatra], which Miller and Lyon use as a parent name for a number of races from the Rhio Archipelago and the chain of Islands off the West Coast of Sumatra, also appears to be darker and duller; but, judging from the dimensions given, decidedly smaller than the present form.

The characters given for the skull in our original description do not unfortunately all hold good. Five of the present seven skulls have the interpterygoid space decidedly horse-shoe-shaped, not parallel-sided, though it is on the average slightly narrower than in *vociferans*. As stated previously the teeth on the whole are rather smaller and the area of surface in equally aged specimens decidedly less.

The skulls, however, can best be separated from those of *vociferans* by the much heavier temporal and parietal ridges and by the broader rostrum; the interorbital breadth also appears to be relatively greater. The length and breadth of the palatal foramina are so variable that no reliance can be placed on them for differential characters.

For measurements see table p. 288.

27. ***Rattus rajah ravus*** (Robinson & Kloss).

Epimys ravus, Robinson & Kloss, Journ. Straits Branch Roy. Asiat. Soc. No. 73, p. 272 (1916).

Rattus rajah ravus, Robinson & Kloss, Journ. F. M. S. Mus. viii, pt. II, p. 43 (1918).

5 ♂ Rimbo Pengadang, Lebong, Bencoolen, 1,000 metres [Nos. E. J. 17, 40, 42, 62, 67.]

2 ♂ Suban Ajam, Redjang, Bencoolen, 1,000 metres [Nos. E. J. 110, 112.]

These specimens quite agree with topotypes from Korinchi except that a rather larger percentage (four out of seven) have the white of the thigh narrowly continuous with that of the hind-foot.

For measurements see table p. 290.

28. ***Rattus inflatus*** (Robinson & Kloss).

Epimys inflatus, Robinson & Kloss, Journ. Straits Branch Roy. Asiat. Soc. No. 73, p. 273 (1916).

Rattus inflatus, Robinson & Kloss, Journ. F. M. S. Mus. viii, pt. II, p. 45 (1918).

12 ♂ Suban Ajam, Redjang, Bencoolen, 1,000 metres [Nos. E. J. 88-9, 92-5, 103, 105, 108-9, 110, 115.]

17 ♂ 12 ♀ Air Njuruk, Dempo, Pasumah, Palembang, 1,400 metres [Nos. E. J. 128, 131, 133-4, 140, 142, 146-8, 156-7, 163, 169, 171-2, 175, 179, 129, 130, 132, 141, 144-5, 164-5, 170, 173, 180, 184.]

The characters of this series are very constant except on the underparts where a good deal of variation occurs. Sometimes the lower surface is dirty white with considerable greyish areas, owing to exposure of the greyish under-surface; sometimes it is much suffused with ochraceous and has the throat and foreneck auburn. The elongate, brown mesial area—which looks like dirt or stain—is, however, always a constant feature. This seems to be one of the commonest

Sumatran hill-rats, occurring side by side with *Rattus rajah ravus* (for dirty stained examples of which it might easily be mistaken) but it is a very distinct species which was first obtained by us on our Korinchi Expedition of 1914.

For measurements see table p. 291.

29. *Rattus orbus fraternus* (Robinson & Kloss).

Epimys fraternus, Robinson & Kloss, Journ. Straits Branch Roy. Asiat. Soc., No. 73, p. 273 (1916).

Rattus orbus fraternus, Robinson & Kloss, Journ. F. M. S. Mus. viii, pt. II., p. 47 (1918).

1 ♂ juv. Rimbo Pengading, Lebong, Bencoolen, 1,000 metres [No. E. J. 56.]

1 ♂ juv., 1 ♀ ad. Suban Ajam, Redjang, Bencoolen, 1,000 m. [Nos. E. J. 96, 113].

1 ♂ ad. Pasumah Estate, Pasumah, Palembang, Dempo, 900 m. [No. E. J. 208.]

10 ♂ 9 ♀ Air Njuruk, Pasumah, Palembang, Dempo, 1,400 m. [Nos. E. J. 138, 139, 174, 176, 183, 185, 186, 193, 194, 207; 135, 162, 168, 177, 178, 181, 182, 192, 195.]

1 ♂, 1 ♀ Air Gaung Ketjil, Pasumah, Palembang, Dempo 1,800 m. [Nos. 200, 205.]

These animals all agree with the typical series obtained at similar altitudes in the Korinchi country and none of them show the reduced spines which are found in examples from that region at heights above 7,000 feet, (2100 m). Though it is sometimes much reduced, the fulvous chest-mark which distinguishes it from *orbus* of the Malay Peninsula¹ is always present: in one example with extreme development of fulvous it extends as a broad line down the abdomen to the vent.

For measurements see table p. 290.

30. *Rattus hylomyoides* (Robinson & Kloss).

Epimys hylomyoides Robinson & Kloss, Journ. Straits Branch Roy. Asiat. Soc. No. 73, p. 273 (1916).

Rattus hylomyoides, Robinson & Kloss, Journ. F. M. S. Mus. viii., pt. II, p. 48 (1918).

1 ♂ ad., 2 ♂ juv., 1 ♀ ad. Air Gaung Ketjil, Pasumah, Palembang. 1,800 metres. [Nos. E. J. 199, 197, 198, 206.]

Both the adults, which have well-worn teeth, are a trifle larger than any of the type series but otherwise agree perfectly.

The young animals are, as usual, greyish black; the ochraceous tawny tips to the hairs, which give the characteristic colour to the older animals being almost absent.

For measurements see table p. 289.

1. *Epimys orbus*, Robinson & Kloss, Ann. & Mag. Nat. Hist. (8) XIII, p. 228 (1914).

31. *Rattus whiteheadi* (Thomas).

Mus whiteheadi, Thomas, Ann & Mag. Nat. Hist (6) xiv, p. 457 (1894).

Mus asper, Miller, Proc. U. S. Nat. Mus. xxvi, p. 463 (1903); Lyon *ibid*, xiv, p. 644 (1908).

Rattus whiteheadi, Robinson & Kloss, Journ. F. M. S. Mus. viii, pt. II, p. 49 (1918).

7 ♂, 1 ♀ Rimbo Pengading, (Moeara Enim) Bencoolen. [Nos. E. J. 18, 19, 20, 35, 41, 48, 61, 68.]

1 ♂ Suban Ajam (Redjang) No. E. J. 101.

1 ♂ 1 ♀ Air Njuruk (Pasumah) Palembang, [Nos. E. J. 187, 188.]

In colour this series is rather brighter than usual, three or four of the specimens being intensely ferruginous below, but we cannot find any grounds on which Sumatran representatives of *whiteheadi* can be separated from typical Bornean animals. As we have recently gone fully into our reasons for this conclusion (l. c. s.) there is no need to repeat them here.

32. *Rattus muelleri muelleri* (Jent).

Mus mülleri, Jentink, Notes, Leyden Mus. ii, p. 16 (1880).

Rattus muelleri, Robinson & Kloss, Journ. F. M. S. Mus, viii, pt. II, p. 51 (1918).

a-b. ♂ ♀. Suban Ajam (Kaba Volcano) Bencoolen, West Sumatra. 15th-16th July, 1916. [Nos. E. J. 111, 114.]

The nomenclature of this group of rats is attended with considerable obscurity owing to the fact that the original description by Jentink is very generalised while his type, according to Miller, is an immature animal with an imperfect skull lacking the posterior portion and the bullae. It is possible, but not probable, that the type is conspecific with the animals described as *Mus bullatus* by Lyon, which are very distinct from those of the present species, characterised *inter alia* by their very large bullae.

So far as our knowledge goes, however, *bullatus* is a strictly lowland animal, whereas *muelleri* was obtained on Batang Singgalang, a mountain in the Padang Highlands.

The species was also obtained by us in West Sumatra, both in the Korinchi highlands and at sea level and in order to avoid confusion we have regarded those from Korinchi as identical with true *R. muelleri*, while describing the coastal form as a subspecies, *Rattus muelleri campus*.

It is, however, perhaps doubtful if this subspecies can be maintained, as one of the present pair agrees very closely with it in cranial characters, the colour differences we were

able to assign being somewhat indefinite, though it would appear that the mountain animals are duller and more buffy grey on the belly which is less clearly defined from the colour of the flanks than in those from the lowlands.

All the forms from the larger land masses of the Malaysian area are extremely closely allied and only separable on average differences, these forms being:—

(a) *Rattus muelleri muelleri* (Jentink) supra. West Sumatra (Mountains).

(b) *Rattus muelleri campus*, (Robinson & Kloss), Journ. Straits Branch Roy. Asiat. Soc. No. 73, p. 275 (1916). West Sumatra (Coast).

(c) *Rattus muelleri firmus*, (Miller). Rhio Archipelago.

(d) *Rattus muelleri validus*, (Miller), Proc. Biol. Soc. Washington, xiii, p. 141, pl. III & IV, fig. 1 (1900).

Malay Peninsula over its length and Southern Siam.

(*Epimys victor*, Miller, tom. cit. postea, p. 10, appears to be a pure synonym of *R. m. validus*. When sufficient series from all Peninsular localities are examined the alleged differences in size and teeth are illusory.)

(e) *Rattus muelleri borneanus*, Miller. Smithsonian Misc. Coll. 61, p. 15 (1913). Borneo.

The species has not at present been recorded from Java.

The two specimens listed above, though there is no very great difference in age, differ greatly in cranial characters: the male, besides being very much larger, has much longer and narrower palatal foramina, larger and more globose bullae and a relatively longer and more slender rostrum, more pointed in the region of the premaxillaries. Externally there is a greater admixture of fulvous buff in the pelage and the undersurface is rather more buffy grey.

The teeth of the West Sumatran races are slighter and narrower than in the Malayan and Bornean forms, those of *R. m. firmus* being intermediate.

Mr. Jacobson records the specimens as having been trapped in jungle.

For measurements see table p. 288.

33. *Rattus rattus neglectus*?

Mus neglectus, Jentink, Notes Leyden Museum, II, p. 14 (1880).

1 ♂, 7 ♀. Suban Ajam, Redjang, Bencoolen [Nos. E. J. 117-120, 122, 124-126.]

Two of these animals with white underparts (Nos. 125, 6), are undoubtedly *neglectus*. The remainder are either young, or have the skulls much damaged, and it is impossible to speak of them with certainty: though however, they have

greyish underparts we do not think they have anything to do with our recently described *R. r. argentiventer*. [Journ. Straits Branch Roy. Asiat. Soc. No. 73, p. 274 (1916); Journ. F. M. S. Mus., viii, p. 55 (1918)].

34. *Rattus griseiventer*?

Mus griseiventer, Bonhote, Fasciculi Malayenses, Zool. Part I, p. 30, pl. ii, fig. 3 & pl. iv, fig. 5 (1903).

1 ♂ imm. Suban Ajam, Redjang, Bencoolen [No. E. J. 75.]

1 ♂ subad. Rimbo Pengadang, Lebong, Bencoolen [No. E. J. 69.]

These two specimens are young but appear to be members of this species: we refer them to it with hesitation however, as it has not previously been met with in Sumatra, and we are not acquainted with *Mus diardi* Jentink, from Western Java (Notes Leyden Museum II, p. 13 (1880).)

Mr. Jacobson notes that they were taken in a house which lends colour to our identification.

35. *Rattus concolor ephippium* (Jent).

Mus ephippium, Jentink, Notes Leyden Museum, II, p. 15 (1880).

Rattus concolor ephippium, Robinson & Kloss, Journ. F. M. S. Mus. viii, pt. II, p. 56 (1918).

1 ♂ aged. Suban Ajam, Redjang, Bencoolen. [No. E. J. 123.]

An example with worn teeth and much abraded pelag rather more rufous above than usual, but this colour is probably the result of "bleaching."

For measurements see table p. 291.

MEASUREMENTS OF *Tupaia* spp FROM S W SUMATRA.

| | | | | | | | | | | Skull | | | | | | | | | | No | Age and Condition of teeth | | | | |
|--|---------------|-----------|-----------|-----------------|--------------|----------------|--------------|-------------------------------|-----------------------------|-----------------------|-------------------|----|----|----|----|----|----|---|----|-----|----------------------------|------------|---------|--------|-----------|
| Sex | Head and Body | Tail | H F | Greatest Length | Basal Length | Palatal Length | Upper molars | Pmx to tip of lachrymal notch | Rostral breadth at Diastema | Inter orbital breadth | Zygomatic breadth | | | | | | | | | | | | | | |
| <i>Tupaia glis</i> Jackl R & K | | | | | | | | | | | | | | | | | | | | E J | | | | | |
| Rumbo Pengadang 1 000 m (3280 ft) | Barisan Range | W | Sumatra | ♂ | 150 | 155 | 42 | 50 | 0 | 44 | 0 | 27 | 2 | 13 | 21 | 4 | 7 | 2 | 14 | 2 | 5 | 5 | 20 | Sub ad | unworn |
| <i>Tupaia javanica occidentalis</i>, R. b & Kloss | | | | | | | | | | | | | | | | | | | | | | | | | |
| Suban Ajam, Kaba Volcano, W Sumatra (1 200 m) | | | | ♂ | 136 | 150 | 33 | 42 | 2 | 37 | 0 | 21 | 7 | 12 | 1 | 16 | 3 | 6 | 1 | 12 | 9 | 79 | Ad sl | worn | |
| Gannug Dempo " (1 000 m) | | | | ♂ | 141 | 158 | 33 | 5 | 42 | 1 | 36 | 2 | 21 | 7 | 11 | 9 | 16 | 0 | 6 | 1 | 12 | 3 | 127 | Ad ml | worn |
| Pasumah Estate " (2 000 M) | Gannug Dempo | W Sumatra | (1 400 m) | ♂ | 140 | 158 | 35 | 43 | 0 | 37 | 1 | 21 | 9 | 12 | 1 | 16 | 1 | 6 | 0 | 12 | 2 | 158 | Ad sl | worn | |
| Tjibodas W Java 4 500 feet | | | | ♂ | 142 | 167 | 35 | 42 | 8 | 36 | 3 | 21 | 2 | 12 | 1 | 16 | 0 | 5 | 9 | 13 | 1 | 203 | Ad worn | | |
| Kuntang Badak Gede W Java 7 900 feet | | | | ♂ | 142 | 175 | 36 | 5 | 44 | 0 | 38 | 0 | 21 | 9 | 12 | 2 | 17 | 1 | 6 | 3 | 12 | 4 | 210 | Ad m | worn |
| | | | | | | | | | | | | | | | | | | | | | | F M's, Mus | | | |
| | | | | | | | | | | | | | | | | | | | | | | 15-/16 | Ad sl | worn | |
| | | | | | | | | | | | | | | | | | | | | | | 153/16 | Ad sl | worn | |
| | | | | | | | | | | | | | | | | | | | | | | 165/16 | Ad ml | worn | |
| <i>Tupaia javanica javanica</i> Horsf | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sodong Jerok Idjen Masrif nr | Banjoewangi | | | ♂ | 133 | 167 | 38 | 42 | 7 | 36 | 8 | 21 | 7 | 12 | 9 | 17 | 2 | 6 | 4 | 13 | 2 | 73 | 77/17 | Ad | much worn |
| E Java 3 900 feet | | | | ♂ | 142 | 165 | 34 | 42 | 2 | 36 | 9 | 21 | 3 | 12 | 3 | 16 | 1 | 6 | 3 | 12 | 6 | 596/16 | Ad ml | worn | |
| Ongop Ongop Idjen Masrif nr | Banjoewangi | | | ♀ | 135 | 165 | 37 | 43 | 9 | 35 | 1 | 22 | 2 | 12 | 8 | 17 | 6 | 6 | 2 | 13 | 23 | 595/16 | Ad ml | worn | |
| E Java 5 700 feet | | | | | | | | | | | | | | | | | | | | | | | | | |

MEASUREMENTS OF *Tupaia* spp. FROM S.W. SUMATRA.—Continued.

| | Sex | Head and Body. | Tail. | H.F. | SKULL. | | | | | | | | No. | Age and Condition of teeth |
|--|-----|----------------|-------|------|------------------|---------------|-----------------|--------------|--------------------------------|------------------------------|-----------------------|--------------------|-------|----------------------------|
| | | | | | Greatest Length. | Basal Length. | Palatal Length. | Upper molar. | Max to tip of incisival notch. | Kiastal breadth at Diastema. | Interorbital breadth. | Zygomatic breadth. | | |
| <i>Tupaia minor humeralis</i> subsp. nov. | | | | | | | | | | | | | | |
| Bencoolen: town, W Sumatra, 5 m (16 feet) | ♂ | 125 | 155 | 30 | 36 | 7.31 | 17.8 | 0.11.1 | 13.0 | 5.8 | 12.0 | 20.0 | E. J. | Ad. ml. worn. |
| " | ♀ | 127 | 150 | 32.5 | 36.3 | .. | 17.9 | 11.4 | 13.9 | 5.6 | 11.3 | .. | 1 | Sub-ad. sl worn |
| Rimba Pengadang, Barisan Range, W Sumatra, 1,000 m (3,280 feet.) | ♀ | 130 | 143 | 31 | 36.6 | 31.1 | 17.5 | 11.1 | 13.0 | 5.8 | 12.0 | 20.3 | 13 | Ad. sl worn |
| " | ♀ | 131 | 148 | 31 | 37.0 | 31.2 | 18.1 | 11.2 | 13.0 | 5.7 | 11.5 | 20.1 | 30 | Ad. sl. worn. Type. |
| Pasir Cantung, W Sumatra Coast, Lat. 2° 7' | ♂ | 130 | 157 | 32 | .. | .. | .. | .. | .. | .. | .. | .. | 72 | Immature |
| <i>Tana tana tana</i> (Raffles). | | | | | | | | | | | | | | |
| Kimbo Pengadang, Barisan Range, W Sumatra, 1,000 m (3,280 feet) | ♂ | 182 | 163 | 15.5 | 58.8 | 49.9 | 32.0 | 16.1 | 28.0 | 6.1 | 14.6 | 25.0 | 63 | Ad. slightly worn |
| " | ♂ | 189 | 162 | 45 | 60.3 | 51.8 | 33.6 | 17.0 | 29.0 | 5.8 | 14 | 8.25.1 | 66 | Ad. sl worn. |
| Suban Ajam, Kaba Volcano, W Sumatra, 1,000 m. (3,280 feet.) | ♂ | 209 | 170 | 46 | 60.2 | 53.0 | 34.2 | 17.0 | 29.9 | 6.0 | 14.1 | 26.1 | 76 | Sub-ad. worn. |
| " | ♂ | 197 | 152 | 44 | .. | .. | .. | .. | .. | 6.0 | .. | .. | 82 | Ad. much worn. |
| " | ♂ | 199 | 163 | 44 | 60.1 | 52.3 | 33.0 | 17.0 | 29.7 | 6.0 | 14.9 | 26.0 | 83 | Ad. ml. worn. |
| " | ♂ | 195 | 160 | 42 | 58.8 | 51.2 | 32.9 | 17.2 | 28.8 | 6.2 | 15.0 | 25.8 | 84 | Ad. sl worn. |
| " | ♂ | 201 | 174 | 45 | 59.8 | 51.2 | 33.0 | 17.0 | 29.7 | 6.2 | 14.8 | 26.0 | 85 | Ad. sl. worn. |
| " | ♀ | 203 | 174 | 44 | 62.0 | 53.0 | 35.0 | 17.0 | 30.5 | 5.8 | 14.7 | 25.3 | 91 | Ad. v. sl. worn. |
| " | ♀ | 213 | 180 | 46 | 61.5 | 52.7 | 35.0 | 17.4 | 31.0 | .. | 15.1 | .. | 99 | Ad. worn |
| " | ♀ | 198 | 160 | 45 | 59.3 | 50.7 | 32.5 | 16.7 | 28.1 | 6.1 | 14.8 | 25.3 | 100 | Ad. sl. worn. |
| " | ♀ | 186 | 164 | 46 | 58.0 | 50.0 | 32.3 | 16.8 | 28.5 | 6.0 | 14.2 | 24.5 | 106 | Ad. unworn. |
| " | ♂ | .. | .. | .. | .. | 39.8 | 51.2 | 33.0 | 16.2 | 29.3 | 6.1 | 15.0 | 155 | Ad. worn. |
| Gantung Dempo, Palembang, W. Sumatra 1,400 m. (4,600 feet.) | ♂ | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 160 | Sub-ad. unworn. |
| " | ♀ | 197 | 162 | 43 | 58.0 | 50.4 | 32.4 | 16.9 | 28.3 | 6.0 | 14.3 | 25.5 | 201 | Ad. worn. |
| " | ♂ | .. | .. | .. | .. | 59.3 | .. | 32.0 | 16.8 | 28.9 | 6.1 | 14.9 | .. | .. |

MEASUREMENTS OF Squirrels FROM S.W. SUMATRA.

| Species and Locality | Sex | Head and body | Tail | Hind foot | SKULL | | | | | | | | No | Age and Condition of teeth |
|---|-----|---------------|------|-----------|-----------------|-----------------|----------------|----------|-----------------|---------------------|----------------------|-------------------|-----|----------------------------|
| | | | | | Greatest length | Condylar length | Palatal length | Diameter | Upper molar row | Median nasal length | Interorbital breadth | Zygomatic breadth | | |
| <i>Callosciurus vittatus</i> (Raffles) | | | | | | | | | | | | | | |
| Bencoolen | ♂ | 195 | 172 | 41 | 47.6 | 4.6 | 1.6 | 11.0 | 5.6 | 3 | 11.1 | 25.0 | 2 | Ad sl worn |
| Sumatra 5 m (16 f.-et) | ♀ | 205 | 152 | 40 | 41.1 | 42.3 | 1.0 | 1.7 | 4.6 | 14.6 | 16.3 | 28.0 | 3 | Subad unworn |
| Do | ♀ | 190 | 176 | 41 | 45.3 | 41.9 | 1.5 | 11.0 | 5 | 14.1 | 17.7 | 28.2 | 5 | Ad ml worn |
| Do | ♀ | 198 | 176 | 43 | 47.0 | 40.0 | 2.2 | 10.8 | 8.1 | 13.1 | 16.0 | 29.1 | 6 | Ad unworn |
| Do | ♀ | 197 | 188 | 44 | 5.5 | 43.0 | 2.2 | 12.0 | 12 | 16.6 | 17.7 | 29.2 | 8 | Ad m worn |
| Do | ♀ | 223 | imp | 45 | 51.7 | 43.8 | 2.4 | 12.1 | 11.1 | 14.8 | 17.3 | 29.0 | 9 | Ad sl worn |
| Do | ♂ | 191 | 170 | 44 | 48.4 | 42.0 | 2.7 | 11.1 | 8.9 | 14.1 | 17.0 | 27.9 | 10 | Ad unworn |
| Do | ♂ | 185 | 185 | 47.5 | 45.9 | 42.1 | 21.8 | 11.8 | 9.2 | 14.1 | 17.1 | 26.2 | 12 | Ad unworn |
| Rimbo Pengalan | ♀ | 193 | 185 | 43 | 50.7 | 43.2 | 22.0 | 12.9 | 9.0 | 14.4 | 16.0 | 29.4 | 33 | Ad ml worn |
| san Range W. Sumatra | | | | | | | | | | | | | | |
| 1,000 m (3,280 feet) | ♀ | 195 | 175 | 41 | 48.2 | 41.5 | 21.7 | 1.7 | 9.2 | 15.0 | 16.4 | 26.0 | 46 | Ad sl worn |
| Do | ♀ | 195 | 160 | 44 | 45.0 | 42.9 | 21.9 | 12.0 | 9.0 | 14.5 | 17.1 | 29.0 | 150 | Ad ml worn |
| Gunung Denai | | | | | | | | | | | | | | |
| 1,400 m (4,600 feet) | | | | | | | | | | | | | | |
| <i>Callosciurus nigrovittatus</i> (Bock) | | | | | | | | | | | | | | |
| Rimbo Pengadank | ♂ | 175 | 155 | 39 | 43.0 | 30.4 | 18.1 | 9.8 | 8.7 | 13.1 | 16.2 | | 16 | Subad unworn |
| san Range W. Sumatra | | | | | | | | | | | | | | |
| 1,000 m (3,280 feet) | | | | | | | | | | | | | | |
| Do | ♂ | 178 | 162 | 39 | 44.6 | 38.2 | 18.3 | 10.1 | 8.5 | 13.6 | 17.0 | 27.5 | 25 | Subad unworn |
| Do | ♀ | 170 | 165 | 41 | | | 18.3 | 9.9 | 8.3 | 12.0 | 16.9 | 27.5 | 26 | Ad ml worn |
| Do | ♀ | 160 | 160 | 30.5 | 44.1 | 37.9 | 18.0 | 9.9 | 8.4 | 12.4 | 16.5 | 28.0 | 32 | Ad worn |
| Do | ♂ | 182 | 157 | 38 | | | 19.0 | 10.1 | 8.5 | | 17.0 | | 36 | Ad worn |

MEASUREMENTS OF Squirrels FROM S.W. SUMATRA—Cont.

| Species and Locality | Sex, and Head and Tail | Hind foot | SKULL | | | | | | | No | Age and Condition of teeth | | |
|--|---------------------------------|--------------|--------------------|-------------------------------|---------------------|---------------|-----------------------|---------------------------|------------------------------|------|----------------------------------|---------------------------|---------------|
| | | | Greatest length | Condylar basilar length | Palatular length | Dia- stema | Upper molar row | Median nasal length | Inter- orbital breadth | | | Zygo- matic breadth | |
| <i>Callosciurus nigrovittatus bocki</i> R & K—Cont | | | | | | | | | | | | | |
| Rimbo Pengadang, Barisan Range, W Sumatra 1,000 m (3,280 feet) | ♀ | 183 | 150 | 36 | 161 | 39.3 | 19.0 | 9.5 | 13.0 | 17.2 | 27.2 | 38 | Ad worn |
| Do | ♂ | 184 | 158 | 39 | 45.9 | 38.6 | 18.1 | 10.0 | 13.0 | 16.7 | 26.9 | 44 | Ad sl worn |
| Do | ♀ | 179 | 146 | 35 | 43.9 | 37.8 | 18.3 | 10.0 | 12.7 | 18.0 | 28.0 | 52 | Ad worn |
| Do | ♀ | 181 | 159 | 40 | 43.1 | 37.2 | 18.2 | 9.9 | 12.2 | 17.1 | 28.1 | 54 | Ad unworn |
| Do | ♀ | 188 | 160 | 40 | 44.7 | 38.0 | 18.1 | 9.9 | 12.3 | 16.5 | 27.0 | 55 | Ad ml worn |
| Do | ♀ | 178 | 160 | 41 | 45.1 | 38.0 | 18.1 | 9.8 | 13.1 | 17.0 | 27.1 | 58 | Subad unworn |
| Do | ♂ | 177 | 158 | 41 | 44.5 | 38.0 | 18.2 | 9.9 | 12.3 | 16.8 | 27.1 | 63 | Ad sl worn |
| Suban Ajam, Kaba Volcano W Sumatra 1,200 m (3,936 feet) | ♀ | 174 | 146 | 36.5 | | | 17.2 | 9.4 | 12.1 | 16.7 | 26.2 | 81 | Subad ml worn |
| Gunung Dempo, Palembang W Sumatra 1,400 m (4,600 feet) | ♀ | 169 | 135 | 37.5 | 42.3 | 35.9 | 16.8 | 9.1 | 11.6 | 15.9 | 25.0 | 86 | Imm sl worn |
| Do | ♂ | 164 | 139 | 39 | | | 17.0 | 9.3 | 11.8 | 15.0 | 26.3 | 143 | Ad unworn |
| Do | ♂ | 164 | 130 | 35 | 42.1 | 35.8 | 17.1 | 9.2 | 12.1 | 16.0 | 26.2 | 159 | Subad. unworn |
| <i>Callosciurus nigrovittatus nigrovittatus</i> (Horsf) | | | | | | | | | | | | | |
| Tjibodas W Java, 5,000 feet | ♂ | 189 | 148 | 44 | 45.0 | 38.9 | | 9.7 | 13.1 | | 27.3 | F M S Mus No 32/16 | Ad sl worn |
| Do | ♂ | 191 | 169 | 42 | 47.8 | 40.7 | | 11.0 | 14.3 | | 27.4 | 33/16 | Ad ml. worn. |
| Do | ♀ | 182 | 176 | 43 | 46.8 | 40.3 | | 10.9 | 13.0 | | 28.1 | 34/16 | Ad worn |
| Do | ♀ | 187 | 152 | 40 | 41.9 | 38.2 | | 10.2 | 13.4 | | 28.3 | 39/16 | Ad unworn |

MEASUREMENTS OF **Squirrels** FROM S. W. SUMATRA—*Cont.*

| Species and Locality | Sex | Head and Body | Tail | Hind foot | SKULL | | | | | | | | No | Age and Condition of teeth |
|--|-----|---------------|------|-----------|-----------------|-----------------|----------------|------------|-----------------|---------------------|-----------------------|--------------------|--------------------|----------------------------|
| | | | | | Greatest length | Condylar length | Palatal length | Dia sterna | Upper Molar row | Median nasal length | Inter orbital breadth | Zygo matic breadth | | |
| <i>Tomomys lowi vanakeni</i> (Rob and Kloss) | | | | | | | | | | | | | | |
| Gaung Dembo Palembang, W Sumatra 1400 m (4,600 feet) | ♂ | 122 | 78 | 29 | 34.0 | 28.0 | 14.3 | 7.8 | 5.6 | 9.4 (app) | 10.9 | 19.2 | EJ 153 | Ad worn |
| Do | ♀ | 117 | 90 | 29 | | | | 7.6 | 5.5 | 9.8 | 11.0 | | 154 FMS Mus 650/14 | Subad unworn |
| Barong Bharu Barisan Range W Sumatra 4000 feet Type | ♂ | 122 | | 30 | 34.0 | 28.1 | 14.0 | 7.8 | 5.7 | 9.2 | 10.5 | 19.2 | | Ad worn |
| Sungei Kumbang korinchi 4,700 feet | ♂ | 120 | 90 | 30.5 | 34.1 | 28.0 | 14.5 | 3 | 5.8 | 9.2 | 10.6 | 20.0 | 364/14 | Ad ml worn |
| <i>Tomomys lowi lowi</i> (Thos) | | | | | | | | | | | | | | |
| Ulu Paku Seribas Sarawak S W Borneo | ♂ | 138 | 86 | 32 | | | 17.2 | 9.2 | 7.1 | 12.3 | | | 117 | Ad ml worn |
| <i>Tomomys lowi robinsoni</i> (Thos) | | | | | | | | | | | | | | |
| Kao Nawing Bandon S W Siam, 1400 feet | ♀ | 122 | 103 | 31.5 | 34.5 | 28.8 | 14.9 | 8.1 | 6.0 | 11.0 | 11.0 | 20.8 | 522/13 | Ad sl worn |
| Near Rawang Selangor Federated Malay States | ♂ | 118 | 85 | 29 | 35.3 | 29.7 | 15.0 | 8.2 | 5.9 | 10.4 | 11.0 | 20.3 | 193/12 | Ad worn |

MEASUREMENTS OF Squirrels FROM S.W. SUMATRA

| Species and Locality | Sex | Head and Body | Tail | Hind foot | SKULL | | | | | N. | Age and Condition of teeth | |
|---|-----|---------------|------|-----------|-----------------|-----------------|----------------|--------------------|-----------------|------|----------------------------|---------------------------|
| | | | | | Greatest length | Condylar length | Palatal length | Diameter of sterna | Upper molar row | | | Median nasal length | Interorbital breadth | Zygomatic breadth |
| <i>Tomeutes tenuis modestus</i> (Mueller) | | | | | | | | | | | | |
| Rimbo Pengadang, Barisan Range, W. Sumatra 1,000 m (3,280 feet) | ? | 140 | 122 | 30 | 38.6 | 32.1 | 10.3 | 8.8 | 7.7 | 13.1 | 22.3 | E J 21 Ad sl worn |
| Do | ♂ | 111 | 115 | 31.5 | 36.5 | 32.8 | 16.7 | 8.9 | 7.6 | 13.0 | 24.2 | 22 Ad sl worn |
| Do | ♂ | 140 | 120 | 32 | 38.8 | 32.3 | 17.0 | 8.6 | 8.1 | 12.1 | 22.8 | 27 Ad unworn |
| Do | ♂ | 150 | 120 | 33 | 30.7 | 33.0 | 16.8 | 8.9 | 8.2 | 13.0 | 24.0 | 42 Ad sl worn |
| Do | ♀ | 140 | 130 | 35 | 38.9 | 33.0 | 17.0 | 9.0 | 7.8 | 12.6 | 23.2 | 59 Subad unworn |
| Do | ♂ | 144 | 128 | 35 | 39.3 | 32.0 | 16.8 | 9.0 | 7.3 | 12.7 | 23.0 | 60 Ad sl worn |
| Do | ♀ | 140 | 110 | 34 | 37.5 | 32.0 | 17.0 | 9.0 | 7.0 | 13.5 | 22.3 | 71 Ad worn |
| Suban Ajam Kaba Volcano W. Sumatra 1,200 m (3,950 feet) | ♀ | 138 | 122 | 33.5 | 37.5 (app) | 31.4 | 16.0 | 8.6 | 7.4 | 11.8 | 12.5 | 97 Subad sl worn |
| <i>Tomeutes tenuis alitundinis</i> (Rob and Kloss) | | | | | | | | | | | | |
| Gunung Dempo, Palembang, W. Sumatra 1,400 m (4,700 feet) | ♂ | 134 | 114 | 35 | 40.1 | 33.0 | 16.5 | 9.1 | 7.6 | 12.6 | 11.8 | 151 Ad sl worn |
| Do | ♀ | 132 | 113 | 33.5 | | | 15.4 | 8.5 | 7.7 (app) | 12.4 | 12.6 | 152 Vix ad unworn |
| Gunung Dempo, Palembang, W. Sumatra 1,600 metres. | ♂ | 141 | 121 | 35 | | | | | 7.1 | 12.0 | 22.1 | 167 Vix ad sl worn |
| Gunung Dempo, Palembang, W. Sumatra 2,200 metres. | ♀ | 136 | 112 | 34 | 38.9 | 31.8 | 15.2 | 8.8 | 7.1 | 12.0 | 11.8 | 202 Subad unworn |
| Korinchi Peak, W. Sumatra 2,230 m (7,300 feet) Type | ♂ | 150 | 115 | 36 | 40.8 | 33.2 | 15.3 | 9.1 | 7.4 | 12.3 | 12.9 | F M S Mus 471/14 Ad. worn |

MEASUREMENTS OF Squirrels FROM S. W. SUMATRA.

| | Sex | Head and body | Tail | Hind foot | SKULL | | | | | | | No | Age and Condition of teeth | |
|---|-----|---------------|------|-----------|-----------------|-----------------|----------------|----------|-----------------|---------------------|----------------------|-------------|----------------------------|-------------------|
| | | | | | Greatest length | Condylar length | Palatal length | Diameter | Upper molar row | Median nasal length | Interorbital breadth | | | Zygomatic breadth |
| <i>Lariscus insignis insignis</i> (Cuv.) | | | | | | | | | | | | | | |
| Kimbo Pengadang, Barisan Range, W. Sumatra 1,000 m (3 280 feet) | ♀ | 194 | 106 | 47 | 50.2 | 13.1 | 22.0 | 12.9 | 9.8 | 7 | 14.1 | 28.7 | E J 74 | Ad worn |
| <i>Lariscus niobe</i> (Thos.) | | | | | | | | | | | | | | |
| Gaung Dempo Palembang, W. Sumatra 1,400 m (4,600 feet) | ♂ | 197 | 96 | 43 | 45.9 | 41.0 | 70.0 | 12.8 | 5.9 | 15.2 | 2.5 | 20.0 | 137 | Ad worn |
| Do | ♀ | 176 | 79 | 40 | 49.0 | 33.5 | 60.3 | 12.7 | 5.0 | 15.0 | 13.0 | | 149 | Ad unworn |
| <i>Rhinosciurus laticaudatus saturatus</i> subsp. nov. | | | | | | | | | | | | | | |
| Kimbo Pengadang, Barisan Range W. Sumatra 1 000 m (3 280 feet) | ♀ | 207 | 111 | 41 | 53.2 | 17.1 | 60.5 | 15 | 12.0 (1 p.) | 6.5 | 11.5 | 27.5 (app.) | 53 | Ad worn |
| Do Type | ♀ | 205 | 130 | 45 | 58.1 | 17.0 | 30.0 | 17 | 1 | 10.8 | 13.0 | 26.2 | 65 | Ad unworn |
| <i>Rhinosciurus laticaudatus leo</i> (Thos. and Wrought) | | | | | | | | | | | | | | |
| Changi, Singapore Island | ♂ | 206 | 105 | 41 | 57.1 | 50.0 | 59.0 | 17.2 | 11.1 | 20.4 | 15.0 | 27.4 | F M S Mus 377/12 | Ad worn |
| <i>Teletype</i> | | | | | | | | | | | | | | |

MEASUREMENTS OF RATS FROM S W SUMATRA

| | Sex | Head and Body | Tail | Hind foot | SKULL | | | | | | | No | Age and Condition of teeth | |
|--|-----|---------------|------|-----------|-----------------|------------------------|-----------|-----------------|-------------------------|---------------------|-------------------------|------|----------------------------|--------------------|
| | | | | | Greatest length | Condyle basilar length | Dia stema | Upper molar row | Length palatal foramina | Median nasal length | Breadth combined nasals | | | Zygo matic breadth |
| Rattus muelleri muelleri (Jent.) | | | | | | | | | | | | | | |
| Subar Ayam Bencoolen W Sumatra, 1000 m | ♂ | 224 | 310 | 40 | 56.8 | 50.2 | 16.7 | 9.4 | 9.2 | 23.0 | 6.0 | 26.3 | 114 | Ad m worn |
| Do | ♀ | 209 | 278 | 44 | 50.0 | 43.2 | 13.8 | 9.0 | 8.0 | 20.0 | 5.9 | 24.0 | 111 F M S Mus | Ad sl worn |
| Rattus validus firmus (Viller) | | | | | | | | | | | | | | |
| Pulau Karimon, Rhio Archipelago | ♂ | 200 | 247 | 45 | 52.0 | 45.0 | 14.1 | 9.0 | 9.2 | 21.1 | 5.8 | 25.3 | 112/08 F M S Mus | Ad worn |
| Do | ♂ | 198 | 259 | 47 | 51.4 | 46.2 | 14.0 | 9.2 | 9.0 | 20.2 | 5.8 | 26.1 | 118/08 F M S Mus | Ad worn |
| R. sabanus ululans. (Rob & Kloss) | | | | | | | | | | | | | | |
| Rimbo Pengadang Barisan Range W Sumatra 1000 m | ♂ | 246 | 414 | 40 | 54.9 | 47.9 | 14.4 | 10.1 | 8.1 | 21.0 | 5.9 | 24.2 | E J 29 | Ad sl worn |
| Do | ♂ | 251 | 397 | 47.5 | 55.3 | 48.2 | 14.8 | 9.9 | 8.0 | 22.1 | 6.1 | 25.8 | E J 39 | Ad sl worn |
| Suban Ayam Bencoolen, W Sumatra 1200 m | ♂ | 261 | 418 | 51 | 58.7 | 49.8 | 15.1 | 10.3 | 8.0 | 24.0 | 6.2 | 28.0 | E J 97 | Ad ml worn |
| Gunung Dempo, Palembang, W Sumatra 1400 m | ♀ | 235 | 405 | 47 | 55.5 | 49.3 | 16.1 | 9.5 | 8.8 | 22.3 | 6.0 | 27.1 | E J 137 | Ad ml worn |
| Do | ♀ | 243 | 385 | 46 | 56.4 | 49.3 | 15.5 | 10.0 | 8.2 | 21.1 | 6.2 | 26.1 | E J 189 | Ad worn. |
| Do | ♂ | 246 | 410 | 47 | 56.0 | 48.8 | 15.0 | 10.2 | 9.0 | 21.7 | 5.9 | 25.8 | E J 190 | Ad sl worn |

MEASUREMENTS OF RATS FROM S. W. SUMATRA.—Cont.

| | Sex | Head and body | Tail | Hind foot | SKULL | | | | | | | No | Age and Condition of teeth | |
|--|-----|---------------|------|-----------|-----------------|-----------------|--------------------|-----------------|----------------------|---------------------|----------------------------|-----------|--------------------------------|--------------------|
| | | | | | Greatest length | Condylar length | Diameter of sterna | Upper molar row | Length of premaxilla | Median nasal length | Breadth of combined nasals | | | Zygomatic breadth |
| R. sabanus ululans. —Cont | | | | | | | | | | | | | | |
| Gunung Dempo, Palembang, W Sumatra 900 m | ♀ | 240 | 398 | 45 | 54.6 | 47.0 | 15.1 | 9.3 | 7.8 | 20.0 | 6.3 | 26.1 | E J 213 F M S Mus 233/14 | Ad sl worn |
| Solak Dras, Korinchi W Sumatra 980 m | ♂ | 237 | 353 | 45 | 53.1 | 46.0 | 14.2 | 9.6 | 7.4 | 20.4 | 6.0 | 24.8 | | Ad sl worn Type |
| R. hylomysoides. | | | | | | | | | | | | | | |
| Air Saung Kechil Do | ♂ | 137 | 140 | 29 | 35.4 | 31.0 | 8.9 | 6.2 | 5.0 | 12.0 | 3.8 | 16.1 | E J 99 | Ad sl worn |
| | ♀ | .. | .. | .. | 35.2 | 29.8 | 9.0 | 6.2 | 5.1 | 11.7 | 3.9 | 16.2 | 206 | Ad sl worn |
| Rattus whiteheadi. | | | | | | | | | | | | | | |
| (Thos) | | | | | | | | | | | | | | |
| Rimbo Pengadang (M Enm) Bencoolen | ♂ | 107 | 111 | 27 | 32.8 | 26.8 | 8.0 | 5.2 | 4.9 | 11.6 | 4.0 | 16.0 | 18 | Ad sl worn |
| Do | ♀ | 120 | 108 | 25 | 32.7 | 28.4 | 8.0 | 5.2 | 4.8 | 11.0 | 3.7 | 15.2 | 19 | Ad sl worn |
| Do | ♂ | 124 | 99 | 27.5 | 32.8 | 27.0 | 8.0 | 5.2 | 5.1 | 10.6 | 3.8 | 15.0 | 20 | Ad sl worn |
| Do | ♂ | 104 | 106 | 26.5 | 33.0 | 26.9 | 7.7 | 5.5 | 5.0 | 11.6 | 3.6 | 15.0 | 35 | Ad sl worn |
| Do | ♂ | 104 | 105 | 27 | 32.9 | 27.2 | 8.0 | 5.3 | 4.6 | 11.4 | 3.3 | 14.9 | 41 | Ad sl worn |
| Do | ♂ | 121 | 105 | 27 | 33.0 | 28.5 | 8.2 | 5.3 | 4.9 | 11.2 | 3.0 | 15.1 | 48 | Ad sl worn |
| Do | ♂ | 123 | 105 | 29 | 33.8 | 27.7 | 8.4 | 5.4 | 4.9 | 11.3 | 3.8 | 15.1 | 61 | Ad sl worn |
| Do | ♂ | 113 | 113 | 29 | 34.1 | 28.2 | 8.5 | 5.4 | 5.9 | 11.7 | 4.0 | 16.1 | 68 | Ad sl worn |
| Do | ♀ | 113 | 113 | 28 | 32.3 | 27.0 | 8.1 | 5.3 | 4.7 | 11.3 | 3.9 | 15.4 | 101 | Ad sl worn |
| Suban Ajam (Redjang) Bencoolen | | | | | | | | | | | | | | |
| Air Njuruk (Pasumah) Palembang | ♀ | 117 | 84 | 24 | 31.8 | 27.2 | 8.1 | 5.3 | 5.0 | 10.2 | 3.9 | 15.9 | 167 | Ad worn |
| Do | ♂ | 114 | 111 | 25 | 32.7 | 26.9 | 7.9 | 5.4 | 5.1 | 10.9 | 3.4 | 15.5 | 188 | Ad sl worn |
| Max and Min | | 104/124 | 111 | 24/29 | 32.7/34 | 126.8/25.5 | 7.7/8.5 | 5.2/5.5 | 4.6/5.1 | 10.2/11.6 | 3.3/4.0 | 14.9/16.0 | | |

MEASUREMENTS OF RATS FROM S.W. SUMATRA.

| Species and Locality | Sex | Head and body | Tail | Hind foot | Ear | SKULL | | | | | | | | No | Age and Condition of teeth. |
|---|-----|---------------|------|-----------|------|--------------|-------------------------|---------------------|-----------------|-------------------------|---------------------|---------------|-------------------|-----|-----------------------------|
| | | | | | | Great length | Cond. of basilar length | Diameter of foramen | Upper molar row | Length palatal foramina | Median nasal length | Breadth nasal | Zigomatic breadth | | |
| Rattus rajah ravus (Rob & Kloss) | | | | | | | | | | | | | | | |
| Limbo Pengadang (M Enan) Bencoolen | ♂ | 175 | ump | 41.5 | 3 | | | 1 | 0.5 | 0.1 | 1.1 | 4.1 | 15.0 | 17 | Ad scarcely w. |
| Limbo Pengadang (Lebong Bencoolen) | ♂ | 69 | 2.2 | 4.3 | 2.5 | 4 | 40 | 1.8 | 0.8 | 0.8 | 1.6 | 4.0 | 16.7 | 24 | Ad slightly w |
| Do | ♂ | 161 | 17.1 | 10 | 22 | 41 | 34 | 11 | 6.0 | 6.2 | 15.5 | 4.0 | 17.9 | 40 | Ad sc w |
| Do | ♂ | 178 | 20.2 | 41.5 | 25 | 45 | 37.4 | 12 | 6.9 | 6.9 | 16.3 | 4.1 | 20 | 67 | Ad sc w |
| Suban Ajam (Redjang) Bencoolen | ♂ | 201 | 22.0 | 43 | 24 | 45.1 | 40 | 13.8 | 6.3 | 7.8 | 19.6 | 5.0 | 19.3 | 102 | Ad sc w |
| Do | ♂ | 180 | 19.2 | 30.5 | 23 | 44.5 | 37 | 12 | 6.3 | 7.0 | 16.6 | 4.5 | 19.0 | 112 | Ad sc w |
| Rattus orbus frater-nus. (Rob & Kloss) | | | | | | | | | | | | | | | |
| Suban Ajam (Redjang) Bencoolen 1,000 m | ♂ | 140 | 14.0 | 31.5 | 21 | 50.1 | 31.8 | 9.1 | 6.0 | 6.3 | 15.7 | 4.7 | 17.4 | 96 | Ad w |
| Air Njurak Dempo 1,400 m (Pasemah) Palembang | ♂ | 157 | | 31 | 21 | 40.0 | 37.6 | 10.1 | 7.0 | 7.7 | 15.1 | 5.0 | 18.0 | 207 | Ad w |
| Do | ♂ | 156 | 19.1 | 32 | 22 | 39.2 | 32.1 | 10.1 | 6.8 | 6.7 | 15.1 | 4.9 | 17.9 | 139 | Ad sl w |
| Do | ♀ | 132 | 20.7 | 20.5 | 10 | 37.3 | 30.0 | 2 | 6.5 | 6.4 | 13.5 | 4.2 | 17.0 | 162 | Ad sl w |
| Do | ♀ | 148 | 21.2 | 31.5 | 21.5 | 39.9 | 33.0 | 9.9 | 7.1 | 6.9 | 14.2 | 4.0 | 17.7 | 168 | Ad w |
| Do | ♂ | 154 | 22 | 34 | 22 | 41 | 34 | 10.1 | 7.0 | 6.7 | 16.0 | 4.9 | 18.0 | 174 | Ad w |
| Do | ♂ | 151 | 21.5 | 24.5 | 20.5 | 37.2 | 30.5 | 9.3 | 6.5 | 6.0 | 14.0 | 4.7 | 16.2 | 176 | Ad w. |
| Do | ♀ | 150 | 21.3 | 31 | 20 | 40 | 33.5 | 1 | 6.0 | 6.8 | 15.8 | 4.8 | 17.0 | 177 | Ad t w |
| Do | ♀ | 152 | 22.8 | 32 | 21 | 40.2 | 34.2 | 10 | 6.0 | 6.1 | 15.4 | 4.8 | 17.0 | 181 | Ad sl w |
| Do | ♀ | 152 | 20.6 | 20 | 20.5 | 39.3 | 37 | 9.9 | 6.5 | 6.3 | 15.1 | 4.9 | 17.9 | 185 | Ad w |
| Do | ♂ | 147 | 23.0 | 33.5 | 21.5 | 41.3 | 34 | 10.8 | 6.1 | 6.0 | 16.0 | 5.0 | 17.4 | 208 | Ad much w |
| Pasumah Estate (Pasumah Dempo 900 m Palembang) | | | | | | | | | | | | | | | |

MEASUREMENTS OF RATS FOR S.W. SUMATRA.

| Species and Locality. | Sex. | Head and body. | Tail. | Hind foot S A | Ear | SKULL | | | | | | | | No | REMARKS. | Breadth across protuberances |
|--|------|----------------|-------|---------------|------|-----------------|-----------------|----------|-----------------|-------------------------|----------------------|-----------------|--------------------|----------|------------|------------------------------|
| | | | | | | Greatest length | Condylar length | Diameter | Upper molar row | Length palatal foramina | Median nasal length. | Breadth nasals. | Zygomatic Breadth. | | | |
| Rattus inflatus (Rob. & Kloss.) | | | | | | | | | | | | | | | | |
| Suban Ajam (Redjang) Bencoolen. | ♂ | 193 | 177 | 39 | 24 | 47 | 39 | 13 | 70 | 81 | 17.7 | 5.4 | 20 | E. J. 88 | Ad. w. | 10.3 |
| Suban Ajam | ♂ | 173 | 182 | 38.5 | 22.5 | 45.5 | 38 | 12.2 | 65 | 71 | 17.2 | 4.9 | 19.8 | 89 | Ad. sl. w. | 9.8 |
| Suban Ajam | ♂ | 179 | 171 | 39 | 23 | 44.7 | 37.2 | 12 | 7 | 78 | 17 | 6.1 | 19.5 | 94 | Ad. sl. w. | 9.9 |
| Air Njuruk Dempo, 1,400 m. Palembang, Palembang. | ♂ | 159 | 158 | 38 | 23 | 42 | 34.2 | 11.3 | 6 | 69 | 13.3 | 5 | 18.9 | 131 | Ad w | 10.0 |
| Air Njuruk | ♀ | 177 | 170 | 38 | 23 | 45.7 | 37.5 | 12.7 | 7 | 77 | .. | 5.9 | 20.4 | 132 | Ad. w. | 10.1 |
| Air Njuruk | ♂ | 171 | 167 | 39.5 | 24 | 43.8 | 36 | 12 | 60 | 72 | 17.1 | 5.0 | 19.1 | 133 | Ad. sl w | 9.8 |
| Air Njuruk | ♂ | 169 | 147 | 36 | 23 | 43 | 35.2 | 10.8 | 6.3 | 7 | 15.5 | 5.1 | 19 | 134 | Ad. w. | 9.1 |
| Air Njuruk | ♀ | 179 | 156 | 37 | 25.5 | 44.5 | 4 | 12.4 | 7 | 7 | 16.2 | 5 | 19.2 | 144 | Ad sl. w. | 9.9 |
| Air Njuruk | ♀ | 175 | 157 | 35.5 | 22 | 4 | 36.2 | 12 | 6.5 | 7.2 | .. | 5.2 | 19.7 | 145 | Ad. w. | 10.1 |
| Air Njuruk | ♂ | 164 | 167 | 37.5 | 23 | 44 | 40 | 12.2 | 6 | 7.1 | 16.8 | 5 | 19.6 | 163 | Ad sl. w. | 9.5 |
| Rattus concolor ephippium (Jent) | | | | | | | | | | | | | | | | |
| Suban Ajam (Redjang) Bencoolen. | ♂ | .. | .. | .. | .. | 32.9 | 28 | 8.8 | 5.0 | 5.7 | 12 | 3 | 15.1 | 123 | Ad. v w | .. |

XXXII. NOTES ON THE SUMATRAN HARE.

By E. JACOBSON AND C. BODIN KLOSS.

(plate V, fig. 2)

The Hare of Sumatra has been up to now one of the rarest animals in collections. As far as I know, the Museum of Natural History at Leyden is the only one in possession of specimens; one being the type-specimen, described by the late Prof. Schlegel in the "Notes from the Leyden Museum" Vol. 2, 1880, pp. 59-65, the second being presented in August, 1916, by Mr. Stolz of Soerian (Padang Highlands, Sumatra).

I was told by Dr. Jentink himself that it was he who drew up the description of the type for Prof. Schlegel.

The first skin was presented to the Leyden Museum by Mr. E. Netscher, at the time member of the Council of Netherlands India and formerly Resident of the Padang Highlands in Sumatra. The specimen sent over in spirit arrived in such a poor condition that it was not even possible to ascertain the sex of the animal. It was said to have been found at Padang Pandjang, a place in the Padang Highlands with densely populated and intensively cultivated surroundings, making it very probable that the animal must have been caught on the slopes of the neighbouring mountains; in this case one of the three volcanoes, Merapi, Singgalang and Tandikat. The conditions under which this rare animal had been captured are not known. After this first and unique specimen nothing was heard of the animal again, at least no intelligence reached the scientific world. Several naturalists who visited the Padang Highlands tried in vain to obtain some more examples, and consequently the presumption was made that this rabbit must have had a very restricted distribution and had of late been exterminated as its natural haunts were destroyed by the spreading of cultivation.

The supposition that the animal had been of very local occurrence seemed to be supported by the fact that it was quite unknown to the natives of any part of the Padang Highlands and consequently had no indigenous name.

When in 1913 I began travelling in that country for collecting purposes I was prompted by the desire to rediscover this rare species. After long and at first fruitless inquiries I came to know that in several parts of the Padang Highlands and at different times captures, which, however, never came to be known in scientific circles, had been made of the Hare. Notably Mr. J. A. Piepers, manager of the coffee-estate Bukit Gompong, on Gunung Talang, informed me that in clearing the forest his coolies had in former years repeatedly obtained living specimens which he had been able to keep alive for a considerable time, some

of them for a whole year. Since 1909, however, none were caught, which fact he attributed to the extension of the cultivated area on the slopes of Gunung Talang, in consequence whereof the animal seemed to have been exterminated.

Mr van Maarseveen, owner of the coffee-estate Lubuk Sampir, in the east part of the Padang Highlands, informed me that in 1854 when his estate was started, three or four hares had been caught by the coolies. Other captures were made at more recent dates on several other coffee-estates. The only information from a native source I obtained from an inhabitant of the village of Landjung, near Fort van der Capellen (Padang Highlands). This man told me how he had once caught in a burrow, on one of the wooded hills near his village, an animal quite unknown to him and which to judge from his description, could be none other than *Nesolagus netscheri*.

The information received from Mr van Maarseveen induced me to visit that part of the country in July, 1914. I settled down not very far from Lubuk Sampir in a small hamlet called Balum situated at a height of about 600 metres and surrounded by big forests. After long endeavours I obtained at last a living but severely damaged specimen of the hare. Two natives who had been cutting down the jungle saw the animal escaping from a hole underneath a tree and as they thought it to be a wild cat, they beat it down with a club. Although severely bruised it lived for some days, but when the skin was removed after death it proved to be full of holes and cuts. I was unsuccessful in securing other specimens at this place as I did not know then the proper way to catch them.

In August 1915 I camped out in the forest on the eastern slope of the Peak of Kormih at an altitude of about 1,400 metres. I had with me a number of Kormichien, who were very clever at snaring animals of all kinds. They constructed through the jungle rough hedges in which apertures were left to put in the snares for all kinds of gamebirds. Two rabbits were caught in these snares.

The first one was still alive, but it had torn its skin very badly on rattan thorns and therefore had to be killed. The second one was found dead in the snare, but in trying to skin it I was very much disappointed in finding that the animal had such a tender skin that the process was next to impossible. The skin of this animal was as fragile as wet paper and so I only managed to get it off in several pieces and badly torn.

In 1916 when I stayed in Bencoolen, at a place called Rimbo Pengading, at an altitude of 3,000 m. in the Barisan Mountain, my man caught a living specimen in a snare. It was in perfect condition and I managed to keep it alive for more than a year.

As I was informed that on a coffee-estate on the Gunung Dempu in Upper Palembang hares had repeatedly been caught, I resorted to that place in August 1916 and pitched my camp in the forest on the slopes of Gunung Dempu, at 1,400 metres, near Pasumah Estate. The first day I found a dead rabbit lying in a native coffee-plantation: it was slightly damaged. Later on I obtained two more specimens, both found dead in the snares. Another one was devoured by a marten.

The biological data I was able to gather are the following.

The altitude at which the animal has been found ranges from 600 up to 1,400 metres. The fact that up to now so very few specimens have come into the possession of collectors, and that it has even remained unknown to the natives must be attributed to its nocturnal habits and to its occurrence in remote parts of the forest. In the original description it was stated that it lived in the woods and on sawahs (rice-fields), but the latter statement is decidedly wrong. During daytime it hides away in dark places, only to come forth at night. I may point out that all my specimens were caught at night. All evidence points to its living in burrows at the base of big trees or in holes under the ground. It is, however, very doubtful whether the animal makes the burrows itself, and I am more inclined to the idea that it occupies holes made by other animals. In captivity, at least, it never made any attempt to dig in the ground.

The Sumatran hare is, by far, not so quick in its movements as the European one. During the day it sits nearly motionless, and only feeds at night.

Its food consists chiefly of the juicy stalks and leaves of different species of *Cyrtandra*, which plants form a large percentage of the undergrowth in the forests where it lives. Repeated experiments showed that these plants were preferred to all the others and were consumed in large quantities. Besides these a number of *Aracea* (*Homalomena*) were accepted, but not by preference. Other plants which were eaten, often only reluctantly, are: *Synedrella nodiflora*, *Ipomoea batatas*, *Jussiaea suffruticosa*, different species of *Polygonum*, *Tradescantia* spec., *Elatostemma* spec., *Hemigraphis colorata*, *Trifolium* spec., etc. Cultivated vegetables were as a rule not accepted, neither could I get the animal to eat roots of any description or the bark from different trees. The diet, therefore, is rather different from that of the European hare. In confinement the animal easily takes to cooked rice, young maize, bread, ripe bananas, and sometimes pineapple.

The accompanying photographs will give a good idea of its outward appearance. The absence of any visible tail gives a rather quaint appearance to the animal.

I want to draw the attention to the very peculiar way in which the moulting is effected. In one of the specimens caught by me, on each side of the body a patch of short, felty hairs is to be seen, being the new coat: these patches are quite hidden by the surrounding fur. As said before, the animal has an extremely delicate skin: in fact I do not know any other mammal which is equally tender skinned. To give an idea of the extreme delicacy I may mention the fact that in lifting a dead rabbit by its hindlegs the skin thereof was torn by the weight of the animal. [E. J.].

***Nesolagus netscheri* (Schlegel).**

Lepus netscheri Schlegel, Notes Leyden Museum, II, pp. 59-65 (1880); Snelleman in Midden-Sumatra, IV, part I, Zoogdieren en Vogels, pp. 23-25 and coloured plate (1887); Jentink, Notes Leyden Museum, XIII, p. 217 (1891).

Nesolagus netscheri Forsyth-Major, Trans. Linn. Soc., Zool. VII., pp. 486, 493, 514, plates 37-39 (1899); Lyon, Smithsonian Miscellaneous Collections, Vol. 45, p. 425, plate XCVI (1904); van Bemmelen, Tijdschr. Ned. Dierkund. Verrein. (1909).

Mr. Jacobson was so fortunate as to obtain four examples of this very rare hare from the following localities:—

- i. Air Njuuk (Dempu), Pasumah, S. W. Sumatra, 1,400 metres, 18th August 1916 [No. E. J. 191.]
- ii. Air Bahu (Dempu), Pasumah, 1,400 metres, August 1916 [unnumbered.]
- iii. Pasumah Estate (Dempu), Pasumah, 900 metres, 28th August 1916 [No. E. J. 211.]
- iv. Rumbo Pengadang, Bencoolen, 1,000 metres, 12th June 1916 [No. E. J. 218.]

The species has been well described by Jentink (in Schlegel, t. c. s. pp. 62-65,) and Snelleman has given a coloured plate of the type, but we give the appearance of the present series here as the type animal has hitherto apparently been the only specimen described.

Size that of a rabbit: ears very short: tail so small as not to be noticeable.

Pelage of two kinds: a soft dense underfur and longer, harsher hairs.

General colour above buffy, more or less greyish; the woolly hairs with buffy tips, the longer hairs with brown tips and broad subterminal annulations. Rump and tail bright ferruginous (in one example this colour extends downwards over tail and vent on to the abdomen). A brown stripe, broadest on the face, from muzzle to tail; a brown line from vibrissae roots to ears, surrounding the eye and branching from behind it to the angle of the mouth: ears externally brown; sides of neck, and sometimes the shoulders brown;

a broad brown stripe from the shoulders curving upwards to the rump, where it appears to join the median dorsal stripe; from the above point of junction a broad brown stripe running down the sides at right angles to the median line, but not extending on to the abdomen: the tail and the back of the thighs partially brown. These brown markings on the upper parts are very variable and range in colour from rufous-brown to blackish-brown.

Limbs brown, grizzled with buff, the digits dull dark brown, the nails concealed by a long dense fringe of buffy hair: undersides of feet dull dark brown (in one specimen the pads of the fore-feet are buffy).

Foreneck dull dark brown grizzled with buff, the remaining underparts buffy white, very pale grey at the base of the fur.

On the crown of the head, in the midst of the dark area, a small patch of white hairs.

This is evidently a very variable animal: in the example from Pasumah Estate the upper dark markings are much reduced, the shoulders being buffy, speckled brown by the tips of the hairs only while the dark curved lateral stripes are absent anteriorly.

Unlike in *Lepus* the bevelled edge of the upper incisors (i.e., the working surface) shows no transverse notch and the enamel fold of the front surface is a simple triangular indentation very like that of *Lepus sinensis*¹ but without any filling of cement.

As Mr. Jacobson's specimens were originally preserved in spirit it has been possible to prepare skeletons as well as skins from them. The osteology of the species has been fully dealt with by Forsyth-Major.

Collector's external measurements taken in the flesh: -

| No. | Sex | Head and body | Tail | Hind foot. | Ear | Ear from crown | Ear from orifice |
|-----|-----|---------------|------|------------|------|----------------|------------------|
| 191 | ♂ | 368 | 17 | 67 | 45.5 | 48* | 52* |
| | | | | 69.5* | | 40* | 51* |
| 211 | ♂ | 375 | 17 | 67 | 43 | 45* | 56* |
| 218 | ♀ | 393 | 17 | 87 | 43 | -- | -- |

1. Vide Records of the Indian Museum, XV, p. 92, fig. 13 (1918).

* from spirit specimens

MEASUREMENTS OF THE SKULLS OF *Nesolagus netscheri*.

| No. | .. | .. | .. | E. J. 191 | E. J. - | E. J. 211 | E. J. 218 |
|---|----|----|----|-----------|---------|-----------|-----------|
| Sex | .. | .. | .. | ♂ adult | —subad. | ♂ subad | ♀ aged. |
| Greatest length | .. | .. | .. | 72.0 | 69.5 | 71.0 | 74.0 |
| Condyllo-basilar length | .. | .. | .. | 63.0 | — | 62.0 | 64.5 |
| Basilar length | .. | .. | .. | 56.0 | — | 55.0 | 57.0 |
| Diastema | .. | .. | .. | 21.0 | 20.0 | 21.4 | 20.6 |
| Upper molar row (alveoli) | .. | .. | .. | 15.0 | 13.2 | 13.8 | 16.0 |
| Palatilar length | .. | .. | .. | 28.3 | 25.2 | 29.0 | 28.1 |
| Least breadth of palatal bridge | .. | .. | .. | 8.7 | 9.1 | 9.2 | 9.4 |
| Palate breadth between <i>pm</i> ³ | .. | .. | .. | 12.2 | 12.0 | 12.2 | 12.7 |
| Diagonal length of nasals | .. | .. | .. | 28.8 | 27.0 | 28.2 | 28.2 |
| Least breadth of nasals† | .. | .. | .. | 11.6 | 11.0 | 10.8 | 12.0 |
| Ante-orbital constriction | .. | .. | .. | 13.3 | 12.2 | 12.0 | 15.2 |
| Breadth of brain case | .. | .. | .. | 26.8 | 26.0 | 27.0 | 29.0 |
| Greatest zygomatic breadth | .. | .. | .. | 38.0 | — | 36.8 | 39.3 |

[C.B.K.]

† At about one-third their length from the front

XXXIII. ON MAMMALS, CHIEFLY FROM
THE OPHIR DISTRICT, WEST SUMATRA,
COLLECTED BY MR. E. JACOBSON.

By

HERBERT C. ROBINSON AND C. BODEN KLOSS.

We have been entrusted by Mr. E. Jacobson with a further interesting collection of mammals, chiefly from the mountain known as Mt. Ophir by Europeans but as Gunung Talamau by the Sumatran Malays. Included in the collection are also a few specimens from the foot of the neighbouring mountain, Gunung Pasaman, and from various places in the vicinity of Fort de Kock, the administrative centre of the Padang Highlands.

Gunung Talamau was ascended to its summit, 2,912 m. (9,700 feet), and collections made at various levels.

Mr. Jacobson gives the following account of his expedition:—

"I remained altogether two months (April to June) in the forest on Gunung Talamau but was only able to make very poor collections, as animals proved very scarce, more so than on any other mountain I have visited in Sumatra. Perhaps this is to be ascribed to the very heavy rainfall, which, on the 1,000 metre level, is nearly 6,000 mm. (235 inches per annum). It proved quite impossible to dry my specimens in the sun and I had to put them over the fire after having well wrapped them up in paper."

"It is very strange that on Gunung Talamau a good many species that occur on other equally high mountains are absent, e.g., not a single species of *Arboricola* occurs, while *Sciuridae* and *Tupaiidae* are poorly represented."

"I went up to the top (2912 m.) several times and stopped on the plateau near the top for three nights and four days. On this plateau I got two rats which I suspect to represent a new species." (*Rattus baluensis korinchi*, postea p. 315.)

Gunung Talamau was visited, but not collected on, by Sal. Mueller; his colleague, Dr. Horner, obtained a few mammals on the mountain, including the types of *Pithecus sumatranus*, but otherwise it does not seem to have been visited by any naturalist.

Notwithstanding the difficulties encountered Mr. Jacobson's collection is of considerable interest, including as it does a remarkably fine series of the indigenous *Muridae*, regarding which little has been known until quite recently.

We have had occasion to describe a local race of the rare Mongoose,

MINGOS SIMITOKQUALIUS subsp. UNIFORMIS nov while the collection establishes the Sumatran habitat of the otter, *Lutra simung*, Lesson, regarding which much uncertainty existed.

The collection also includes a single specimen of a form of *Rattus bukit* (Bonh.) not hitherto recorded from Sumatra but in the absence of the skull, which has been unfortunately lost, we attempt no more precise identification.

We find it impossible to identify a single female of an anomalous Leaf Monkey. A specimen apparently somewhat resembling it was obtained by Horner, also on Talaman, and has been the subject of discussion; pending further examples we have, however, left the identification open.

1 *Symphalangus syndactylus syndactylus* (Desm.).

Robinson and Kloss, Journ. Fed. Malay States Mus., VIII Pt. 2, p. 3 (1918).

1 ♂ Gunung Talaman (Mt. Ophir), 600 m (1,950 feet). W. Sumatra, 19th May, 1917 [No. L. J. 290.]

This specimen, adult but not aged, is in every way similar to our series from Korinchi some distance to the south.

(Collector's measurements taken in the flesh. Head and body 530, hindfoot, 150, ear, 33 mm)

(Cranial measurements. Greatest length, 121, basal length, 92.7, zygomatic breadth 76.5, upper tooth-row with canine, 43.6 mm)

2. *Pithecus*. sp.

1 ♀ ad. Gunung Talaman, Ophir District, Sumatra, 1st May 1917 [No. L. J. 247]

1 ♂ juv. suckling of the above. Same details. [No. L. J. 248.]

The adult female exactly resembles some specimens of *P. m. melalophos* (Raffles) from Korinchi (vide Journ. F.M.S. Mus., VIII, pt. 2, p. 4) except that it is a good deal paler: the disposition of colour is the same and the black areas are just as pronounced, but the cinnamon-rufous and ochraceous-tawny in these specimens are replaced by various tones of buff in this. The specimen, therefore, much more resembles *P. melalophos* (Raffles) from Bencoolen and the southern half of Sumatra (with which it exactly agrees in colour pattern) than the more richly coloured *P. ferrugineus* (Schlegel, Mus. Pays Bas Revue, VII, p. 42, 1876), from Padang, which one would expect to find in the neighbourhood of Mt. Ophir.

In our report on mammals from Korinchi we said (t. c. s., p. 5), that we were inclined to agree with Jentink in his

opinion that *P. melalophos* and *P. ferrugineus* were the same thing and the present specimen seems to lend support to this view. Our own experience of *P. melalophos* is that it is a very variable animal and although we have seen from south of Padang no specimens coloured as those described by Schlegel as *ferrugineus* yet the southern *melalophos* is so unstable a form that it may well embrace both individuals as richly coloured as those and others as pale as the present specimen.

The deep coloured specimen described and figured by St. Hilaire and Cuvier as *melalophos* (Hist. Nat. Mamm. July, 1821), was collected somewhere in Sumatra by Diard and Duvaucel and though Schlegel has transferred it to his *ferrugineus* it is quite possible that it came from the same region as Raffles' own specimens of *melalophos* obtained by the same collectors.

The juvenile animal is dull white, washed with blackish-brown above from the shoulders to the end of the tail; there is a patch of the same colour on the back of the crest and there are a few dark hairs on the fingers of the hands. The tips of the tail and the inner sides of the wrist are slightly tinged with yellowish, showing that the assumption of the adult pelage is just commencing.

At the same time it should be noted that Mueller and Schlegel referred a pale yellowish-red monkey with the four feet and the tip of the crest blackish, which came from the same locality as the present specimen (Mt Ophir), to *P. sumatranus* * and *P. femoralis*. †

Measurements of the skull of the adult female:— greatest length 96; basal length, 61; zygomatic breadth, 75; upper tooth-row with canine (alveoli) 29.

3. *Felis bengalensis sumatrana*, Horsf.

antea, p. 262.

1 ♂ imm. Fort de Kock, 960 m. (3,120 feet), Padang Highlands, West Sumatra; 1st July, 1917 [No. E. J. 368.]

1 ♂ imm. Sukamenanti, 200 m. (650 feet), Ophir District, West Sumatra, 25th August, 1917 [No. E. J. 381.]

Collector's external measurements:—Head and body, ♂ 326, ♀ 341; tail, ♂ 134, ♀ 134; hindfoot, ♂ 84, ♀ 84; ear, ♂ 37, ♀ 37.5 mm.

Both specimens are quite immature and present no special points of interest.

* Mueller and Schlegel, *Verhandelingen*, 1 p. 61, 74, plate 10, bis, fig. 2, var. *aureata* (1839—44)

† Schlegel, *Mus. Pays-Bas*, VII, p. 45

4. **Paradoxurus hermaphroditus hermaphroditus** (Pall.)

Robinson & Kloss, Journ. F.M.S. Mus. VIII, pt. 2, p. 9 (1918).

1 ♀ imm. Lubuk Landur, Ophir District, 200 m. (650 feet), W. Sumatra, 6th May, 1917 [No. E. J. 262.]

1 ♂ imm. Kota Gadang, near Gunung Singgalang, 900 m. (2,950 feet), Padang Highlands, W. Sumatra, 23rd August, 1917 [No. E. J. 380.]

Both specimens are quite immature, with the permanent dentition not yet at the level of the alveolus. The stripes on the upper surface are well marked though somewhat broken up into spots. The female has a strong yellowish suffusion on the upper surface, but the male, which is older, is lighter and greyer, especially posteriorly.

5. **Paguma larvata leucomystax** (G. R. Gr.).

antea, p. 262.

♀ ad. Kota Gadang, near Gunung Singgalang, 1,000 m. (3,250 feet), Padang Highlands, W. Sumatra, 24th September, 1917 [No. E. J. 384.]

A fine, fully adult specimen agreeing well in colouration with that in Mr. Jacobson's previous collection.

Collector's measurements taken in the flesh: Head and body, 479; tail, 537; hindfoot, 99; ear, 44 mm.

Cranial measurements: Greatest length, 126.9; condylo-basal length, 122.2; basal length, 115.6; palatal length, 56.0; greatest diameter of *pm4* 10.0; interorbital breadth 22.4; postorbital breadth 15.8; mastoid breadth 62.5 mm.

6. **Mungos semitorquatus uniformis** subsp. nov.

Herpestes semitorquatus Jentink. Notes Leyden Museum XVI, p. 210 (1894). [Lampongs, S. E. Sumatra.]

Diagnostic characters.—Differs from the typical form from Borneo in having the whole upper surface uniform with no trace of speckling caused by annulation of the hairs, except on the crown.

General colour. Sanford's brown to hazel, the limbs darker and more chestnut, all four feet blackish. Face and sides of head grizzled with buff, an ill-defined buff stripe running part of the way along the side of the neck from behind the ear, hairs concealing the ear-opening buffy. Tail with a grizzled appearance owing to broad subterminal annulations of buff; extreme tips of the hairs dark.

Type. Adult female. Collected at Ayer Taman, Gunung Pasaman, Ophir District, West Sumatra, at 300 m. (975 feet), on 4th May, 1917, by E. Jacobson. Collector's No. 259.

Collector's measurements taken in the flesh: Head and body 435; tail, 310; hindfoot, 89.5; ear 27 mm.

Cranial measurements:—greatest length, 91; condylo-basal length, 87.3; basal length, 80.8; anteorbital breadth, 18.9; width between orbital processes, 33.1; postorbital constriction, 16; mastoid breadth, 35.6; zygomatic breadth, 49.2; palatal length, 44.1; greatest length of upper sectorial, 10.8 mm.

The descriptions of Gray and Anderson give the tail as "black with some white tips to the hairs" (Gray) or "much grizzled as the hairs have long yellow tips succeeding their black subapical bands. The tip is concolorous with the pale ends to the hairs, the black bands having disappeared" (Anderson).

An immature female specimen, posterior upper molars at level of alveolus, greatest length of skull 76 mm., from Mt. Dulit, 4,000 ft., N. W. Borneo, kindly lent us by the authorities of the Sarawak Museum, cannot be said to have any black on the tail, slightly darker reddish subterminal annulations being just perceptible in the basal fourth succeeded by buffy yellow tips. In this skin the whole of the dorsal area has marked pale yellow tips to the hairs, giving a strongly grizzled effect.

Besides the type Mr. Jacobson collected a male at the same place and date (No. E. J. 260). It precisely agrees with the type except that the post-auricular pale stripe is more marked: it too has no trace whatever of annulations to the hairs. The dimensions in the flesh are given as "total length, 470; tail, 290; hindfoot, 91; ear 28 mm." It is however, quite young (milk canines not yet shed; greatest length of skull, 84 mm).

The species seems rare in collections. Lyon (Proc. U.S. Nat. Mus. 33, 1907, p. 559; id., op. cit., 40, 1911, p. 117) records a young male from Sanggau, Kapuas River, Western Borneo, but we are not acquainted with other recent records in the literature.

7. *Mungos brachyurus brachyurus*(Gray).

Mungos brachyurus, Kloss, antea, p. 124 (1917).

1 ♀ ad. Lubuk Landur, Gunung Talamau, 200 m. (650 feet), Ophir District, West Sumatra, 23rd April, 1917 [No. E. J. 223.]

Collectors' external measurements: Head and body, 406; tail, 209; hindfoot, 83.5; ear, 29 mm.

This specimen is unfortunately without a skull, but so far as the skin is concerned cannot be separated from specimens from the Malay Peninsula, which, as Allen has shown (Bull. American Mus. Nat. Hist. XXVII, 1910, p. 17), is to be regarded as the typical locality.

Jentink has distinguished a Bornean animal (type from the Baram District) as *Herpestes hosei* (Notes Leyden Mus. XXIII, 1903, p. 223), but apparently admits the occurrence of the true *H. brachyurus* in that Island.

8. *Martes flavigula henrici* (Westerm.).

Mustela henrici, Westerm., Bijd. tot de Dierkunde, 1, 1849, p. 13, pl. (Padang).

Mustela flavigula henrici, Bonhote, Ann. Mag. Nat. Hist. (7), VII, 1901, p. 346.

1 ♂ ad. Gunung Talamau, 1,300 m. (4,230 feet), Ophir District, West Sumatra, 31st May, 1917 [No. E. J. 325]

1 ♂ aged. Fort de Kock, Padang Highlands, West Sumatra, 920 m. (2,990 feet), 20th November, 1917. [No. E. J. 393.]

Collector's external measurements taken in the flesh: Head and body, 518, 541 (461); tail, 338, 410 (360); hindfoot, 100.5, 101 (91), ear, 34, 37.5 (33)

Skull measurements: greatest length, 94.3, 100 (92.8); condylo-basal length, 93.8, 97.0 (90.8), palatal length, 40.8, 44.1 (40.1), postorbital constriction, 21.0, 23.1 (24.4); mastoid breadth, 42.0, 45.0 (41.1), zygomatic breadth, 51.1, 60.1 (53.1); maxillary tooth row, 27.9, 29.1 (29.0); length of mandible, 58.4, 62.2 (58.1) mm.

These specimens, which are typical of *M. f. henrici* agree well with each other: the post-auricular black stripe is very defined, the upper parts grow darker from the shoulders to the rump and the tail, which is glossy black; Bornean specimens (three compared) appear to be indistinguishable. The race is darker and apparently somewhat larger than the Malay form, *M. f. peninsularis*, Bonhote (loc. cit. supra). Measurements in parentheses are those of an adult female from Tjibodas, W. Java (F.M.S. Mus., 291, 16).

9. *Mustela nudipes nudipes* Desm

Mustela nudipes, Desmarest, Mamm., Pt. II., p. 537 (1822).

Must. nudipes Vigors Cat. Zool. Specimens in Appendix to the Life of Raffles, p. 634 (1830). Habitat in Sumatra.]

Gymnopus leucocephalus, G. R. Gr. P. Z. S., 1865, p. 119.

This species is founded on a figure and description of a specimen (still extant in Paris in 1865) given by St. Hilaire & F. Cuv. (Hist. Nat. Mamm. September, 1821, and plate) which represents an animal with a white tipped tail, stated to have come from Java. We are aware of no recent specimen from that island, while S. Mueller (Verhandelungen, Zoogdieren, p. 30, 1839-44) states "*Mustela nudipes* I once found on the West coast of Sumatra in a forest in the low coastal mountains and I saw two dried skins in Borneo. According to French writers it is also found in Java; but neither Reinwardt, Kuhl, Van Hasselt,

Boie nor myself ever observed it there in a state of nature. Its Javanese origin is more doubtful in that, in the West of the island at least, none of the natives know anything about it. Muell r further comments as follows on the provenance of specimens collected by French naturalists (op cit, p. 13) "in many of the latest zoological books there is great uncertainty and confusion on this point [habitats and distribution]. This concerns especially certain French writers who in the case of animals sent to them from other parts seem without further enquiry to have recognised those parts from which they received the beasts as their natural habitat, whereas the animal often came from different islands and from distant places. One case among others was that of several skins sent by M. Diard to Paris which as he himself told me he collected in Sumatra, Siam and Cochin China but first sent some of them to Europe from Java. We can thus understand how in spite of the number of celebrated French travellers who at various times and places have visited India and the Indian Islands, there are so many mistakes in French zoological works in describing the habitats of varieties. To give only a few instances out of many we confine ourselves to the work of the apes of the old world by Prof. Isidore Geoffroy in *Belanger's Voyage aux Indes Orientales*. In that paper the habitat of most of the Indian varieties is too indefinite in some cases it is wrongly stated. *Hylomys leuciscus* is said to come from the Sunda and Molucca Islands whereas this ape is only found in Java. *Hyl. albinus* *Sumatru* (Linn) on the other hand, which is only found on the mainland is ascribed to Java. Sumatra is specified as the home of *Semnopithecus comatus* (*Semnopithecus mitratus*) but it is only found in Java."

'*Macacus (Inuus) nemestrinus*, *Semnopithecus pruinosus* (*Semnopithecus cristatus*) and *Semnopithecus natus* are all three mentioned as natives of Java and Sumatra whereas the first two varieties live in Sumatra and Borneo and the last only in Java.

Later G. R. Gray renamed the species *G. leucocephalus* apparently because he considered the title *nudipes* incorrect, and further described a cat from Sumatra and Borneo which agrees with specimens and with descriptions of one obtained by Dr. Abbott in South-east Borneo (Ivon Proc. U. S. Nat. Mus. 40, 1911, p. 119).

Vigors also writes of this species (loc. cit.). This species although supposed by the French writers to have been sent from Java, whence they gave it the above name, was never met with by Dr. Hensfield in his extensive researches in that Island. It is probable that the specimen sent by M. Diard from Batavia had been originally imported from Sumatra. Under these circumstances substitute for Java the type locality West Sumatra and suppress the name *G. leucocephalus*.

1 ♂ Kota Gadang, Mt. Singgalang, 1,000 m. (3,250 feet), Padang Highlands, West Sumatra, 1st October 1917 [No. E. J. 385].

1 ♂ Fort de Kock, Padang Highlands, W. Sumatra, 920 m., 31st January, 1918 [No. E. J. 397, 385].

Collector's measurements taken in the flesh: total length, 354; tail, 196; hindfoot, 55; ear, 25 mm.

Skull measurements: Condyle-basal length, 61; basal length, 57; palatal length, 26.7; interorbital breadth, 13.7; postorbital constriction, 14.1; mastoid breadth, 28.9; zygomatic breadth, 32.5 mm.; length of maxillary tooth-row including canine, 16.9; length of lower mandible, symphysis to condyle, 35.5 mm.

Sumatran, Bornean and Malayan skins appear to agree *inter se*. Specimens vary individually but we are unable to definitely associate these variations with locality. The colour appears to depend largely on the state of the pelage especially as regards the pale tip to the tail.

10. *Lutra simung*, Less.

"Simung," Raffles, Trans. Linn. Soc., XIII, p. 254 (May 1821).

Lutra simung Lesson, Man. Mamm., p. 156 (1827); Muller, Verhandelingen, p. 51 (1839—44); Horsfield, Cat. Mamm. Ind. Mus. p. 116 (1851).

1 ♂ ad. Koto Gadang, Mt. Singgalang, Sumatra, 1,000 metres, 21st November, 1917. [No. E. J. 383.]

At least four species of otters occur in Sumatra. Of the identity of two of them, viz., the Hairy-nosed Otter (*L. sumatrana* Gray), and the little Clawless Otter (*L. cinerea* Ill.), there is no question: but some uncertainty exists as to the other two. We have already given our reasons (Journ. F. M. S. Mus., VIII, pt. II, p. 13), for considering *L. barang* Cuv., to be the Malayan representative of *L. lutra*, Linn.*; it is a fairly large animal with slightly grizzled fur and a markedly dentate rhinarium.

The present animal we regard as belonging to the remaining species, *L. simung* Less. Unfortunately the skull of this most interesting specimen was lost in the field but the skin closely agrees with Mueller's description of *L. simung* and with Blanford's account of an otter under the name of *L. ellioti* (Faun. Brit. Ind. Mamm., p. 185), which Thomas states (P. Z. S., 1889, p. 192) is also a member of that species.

Externally this specimen only differs from our *L. barang* (l. c. s.) in being slightly darker above and scarcely grizzled; and in having the upper border of the naked nose slightly concave instead of sharply convex in the centre.

* This name antedates *L. vulgaris* Erxl., previously used by us.

Collector's external measurements: Head and body, 578; tail, 370; hindfoot, 97.5; ear, 18.

The following key will serve to determine the otters of Sumatra:—

A. Size larger: all feet furnished with claws.

a. Skin of nose naked.

a¹ Upper border of naked area
markedly dentate ... *L. l. barang.*

b¹ Upper border of naked area
straight or slightly concave ... *L. sumung.*

b. Skin of nose covered with hair ... *L. sumatrana.*

B. Size smaller: all feet furnished with nails not extending beyond the tips of the toes. ... *L. cinerea.*

11. ***Tupaia javanica occidentalis***, Robinson & Kloss.

antea, p. 265. Journ. F. M. S. Mus. VIII, Pt. II, 1918, pp. 16, 19.

1 ♀ ad. Fort de Kock, 960 m. (3,120 feet), Padang Highlands, West Sumatra, 28th February 1917. [No. E. J. 219.]

1 ♂ ad. Gunung Talamau, 1,300 m. (4,230 feet), Ophir District, West Sumatra, 11th June, 1917. [No. E. J. 339.]

Collector's external measurements: Head and body, ♂ 139, ♀ 140; tail, ♂ 160, ♀ 177; hindfoot, ♂ 34.5, ♀ 34; ear, ♂ 12, ♀ 13 mm.

Skull: greatest length, ♂ 41.8, ♀ 41.8; basal length, ♂ 35, ♀ 35.7; palatal length, ♂ 21.1, ♀ —; upper molar row, ♂ 13.8, ♀ 14; tip of premaxillaries to lachrymal notch, ♂ 16.1, ♀ 16; rostral breadth at diastema, ♂ 6.1, ♀ 5.5; interorbital breadth, ♂ 12.1, ♀ 11.9; zygomatic breadth, ♂ 21.6, ♀ — mm.

Precisely agree with the typical series and with the specimens collected by Mr. Jacobson in the Bencoolen and Palembang Residences.

12. ***Tupaia minor humeralis***, Robinson & Kloss.

antea, p. 265.

Tupaia minor subsp. Robinson & Kloss, Journ. F. M. S. Mus. VIII, pt. II, p. 17 (1918).

1 ♂ Air Taman, 250 m. (800 feet), Gunung Pasaman, Ophir District, West Sumatra, 20th June, 1917 [No. E. J. 364.]

1 ♀. Gunung Talamau, 600 m. (1,950 feet), Ophir District, West Sumatra, 3rd May, 1917 [No. E. J. 258.]

In external characters agreeing well with the types: skull of No. 364 missing.

Collector's external measurements: head and body, 127, 131; tail, 159, 149; hindfoot, 33, 31.5; ear, 11.5, 12 mm.

Skull: greatest length 36; basal length, 31.1; palatal length, 17.3; upper molar row, 12.2; tip of premaxillaries to lachrymal notch, 13.2; rostral breadth at diastema, 5.3; inter-orbital breadth, 12.6; zygomatic breadth, 20 mm.

13. ***Hylomys suillus* Mueller & Schlegel.**

Robinson & Kloss, Journ. F.M.S. Mus., VIII, pt. II, pp. 20, 25 (1918).

2 ♀ vix ad. Gunung Talamau, 1,300 m. (4,230 feet), Ophir District, West Sumatra, 28th May, 1917 [Nos. E. J. 316, 317].

Collector's external measurements: Head and body 115, 129; tail, 15, 15; hindfoot 25.5, 26; ear 15.5 mm.

Skull: greatest length, 32.5,—; basal length 29.0,—; palatal length, 17.7, 18.4; upper tooth row, 17.4, 18.8; *pm4-m3*, 9.0, 9.3; palatal breadth behind canines, 5.8, 6.2; zygomatic breadth, 18.0,—; length of mandible, 24.3, 25.4 mm.

Neither of these specimens is fully adult and in No. 316 the posterior molar is only just above the level of the alveolus. The older specimen is darker and the paler speckling less in evidence, more ferruginous or mahogany and less fulvous. Beneath it is greyer and darker, less washed with buffy.

There is no doubt that the specimens represent Mueller and Schlegel's original species and not our recently described *H. parvus* (*loc. cit.*, pp. 20, 21).

14. ***Galeopterus variegatus temmincki* (Waterh.).**

Robinson & Kloss, Journ. F.M.S. Mus. VIII, part II p. 23 (1918).

♀ imm. Air Taman, Gunong Pasaman, 250 m. (820 feet), Ophir District, West Sumatra, 9th June, 1917 [No E. J. 333.]

Collector's external measurements taken in the flesh: Head and body, 321; tail (imperfect), 144; hindfoot, 71; ear, 20 mm.

Skull measurements: Greatest length, 67.0; external, interorbital breadth, 38.8 mm.

The animal is quite immature, posterior upper molar at level of alveolus. In colour this specimen agrees with the same sex in our series from Korinchi. The shoulders are tinged with buffy chestnut.

15. ***Cynopterus horsfieldi lyoni* Andersen.**

Cynopterus horsfieldi lyoni, K. Andersen, Cat. Chit. Brit. Mus., ed. 2, 1, p. 826 (1912); Robinson & Kloss, Journ. F.M.S. Mus. VIII, pt. 2, p. 27 (1918).

Twelve specimens in alcohol:

1 ♂ ad., 1 ♂ juv., 2 ♀ ad., Lubuk Landur, Ophir District, W. Sumatra, 200 m., April, 1917 [Nos. E. J. 232-5.]

1 ♂ ad., 5 ♀ ad., 2 ♀ juv., Gunung Talamau, Ophir District, April, 1917. [Nos. E. J. 369-376.]

The males are distinguished from the females by redder colouring on neck and upper breast. The adult females vary very little only in dimensions and have skulls equal in size to the second adult male.

Measurements of the largest male and female in the series (Nos. 369 and 232):—

Hindfoot, 17. 15; ear from orifice, 19, 18.6; forearm, 75.5, 76; 3rd digit, metacarpal, 50, 51; tibia 28.8, 29.8. *Skulls*: lambda to gnathion, 36, 34.6; rostrum (orbit to nares) 8.9, 8.1; zygomatic breadth, 25.2, 22.2; mandible 27.1, 26; *c-m*¹ (crowns), 11.7, 11; *m*¹ (length), 2.8, 2.6 mm.

16. **Macroglossus minimus sobrinus** Andersen.

Macroglossus minimus sobrinus K. Andersen, Ann. & Mag. Nat. Hist. (8). VII, p. 642 (1911); Cat. Chir. Brit. Mus. ed. 2, Vol. I, p. 760 (1912.)

1 ♂ ad. (in alcohol) Gunung Talamau, Ophir District, W. Sumatra, 400 m., 24th April, 1917 [No. E. J. 224.]

Forearm, 45; pollex, c. u., 16.8; 3rd digit, metacarpal, 34; ear from orifice, 13.3; tail, 2; tibia 16.2; foot, c. u., 13.

Skull:—Lambda to gnathion, 29.3; rostrum (orbit to nares), 10; mandible, from condyle, 23.4; *c-m*² (crowns) 10 mm.

The mandible is unusually long, the previous maximum recorded being 22.7 mm.

17. **Tylonycteris robustula** Thos.

Tylonycteris robustula Thomas, Ann. & Mag. Nat. Hist. (8) XV, p. 227 (1915.)

2 ♀ ad. (in alcohol). Gunung Talamau, Ophir District, W. Sumatra, 400 m. [Nos. E. J. 377, 8.]

Above dark brown, slightly paler below. Thumb and sole pads blackish-brown like the membranes.

Forearms, 27, 27; tail, 29, 28; 3rd finger, metacarpal, 26.6, 26.5; first phalanx, 11, 10.8; fifth finger, metacarpal, 25.5, 25; first phalanx, 4.8, 5.1; tibia, 12,—; hind-foot, 6.5, 6.4; breadth of footpad 3.9, 3.4; of thumb pad, 3, 3.1.

Skull: greatest length, 13, 13.1; median length, 10.6, 10.8; condyle to front of canine, 12.2, 12.2; interorbital constriction, 4, 4.1; breadth of braincase, 7.6, 7.3; palatosinual length, 3.8, 3.9; front of canine to back of *m*³, 4.2, 4.3; front of *p*⁴ to back of *m*², 2.9, 2.8; zygomatic breadth, 9.4, 9.3 mm.

May be easily distinguished from *Glischropus tylopus* (Dobson) another Malaysian Vespertilionid with fleshy thumb and foot-pads, by its extraordinary flattened head.

18. ***Callosciurus vittatus tapanulius*** (Lyon).

Sciurus vittatus tapanulius, Lyon, Smiths. Misc. Coll. 48, 1907, p. 280.

1 ♂, 1 ♀ Lubuk Landur, 250 m. (800 feet), Ophir District, West Sumatra, 30th April-19th June, 1917 [Nos. 245, 362.]

These specimens differ from the considerable series of typical *C. vittatus vittatus* (Raffles) collected by Mr. Jacobson further south in having the sides of the face much more buffy, the under surface clear richer rufescent, not ochraceous, and both pale and dark lateral stripes narrower and less conspicuous. These in the main are the characters assigned to *Sc. v. tapanulius* described on a series of nine specimens from Tapanuli Bay, some 150 miles further north.

(For measurements see table on p. 318).

19. ***Callosciurus nigrovittatus bocki*** Robinson & Wroughton.

Antea, p. 270; Robinson & Klos., Journ. F.M.S. Mus., VIII, pt. II, p. 31, 1918.

1 ♂, 1 ♀ Gunung Talamau, 12-1,300 m. (3,900-4,225 feet), Ophir District, West Sumatra, 14th May, 1917, 11th June, 1917. [Nos. E. J. 289, 3110.]

These specimens precisely agree with the large series we have seen from other parts of West Sumatra. The species also occurs at Bandar Baroe, Deli, N. E. Sumatra, 860 m. (3,800 feet), but specimens from that locality have not yet been critically examined.

(For measurements see table on p. 318).

20. ***Tomeutes hippurus hippurosus*** (Lyon).

Sciurus hippurosus, Lyon, Smiths. Misc. Coll. Vol. 50, 1907, pp. 26, 27.

1 ♂ ad. Air Taman, Gunung Pasaman, 250 m. (800 feet), Ophir District, West Sumatra, 20th June, 1917 [No. E. J. 363.]

The material available is not sufficient to enable us to form any definite opinion in the distinctness or otherwise of the Sumatran form of this species from that inhabiting the Malay Peninsula. The above specimen agrees well with the description of the type series from Tarussan Bay.

(For measurements see table on p. 318).

21. ***Tomeutes tenuis modestus*** (Mueller).

Antea, p. 272.

1 ♀. Fort de Kock, Padang Highlands, 960 m. (3,320 feet), West Sumatra, 5th March, 1917 [No. E. J. 220.]

Specimens of this sub-montane form can be distinguished from the succeeding mountain race apart from other characters by the orange buff patch in the anal region and at the base of the tail.

(For measurements see table on p. 318).

22. *Tomentes tenuis altitudinis* (Robinson & Kloss).

antea, p. 272.

12 ♂, 9 ♀ Gunung Talamau, 1,000—1,850 m. (3,250—6,020 feet), Ophir District, West Sumatra, 9th May—12th June 1917 [Nos. E. J. 263—5, 283—4, 291, 299—301, 304.5, 309, 313, 321—2, 327, 331—2, 341—2.]

This considerable series shows no variation with the height at which collected and little variation *inter se*, though some are yellowish and less grey beneath. Above the yellowish element on the pelage is more pronounced than in *S. t. modestus* while all lack the rufescent wash on the shoulders that occurs in many specimens of the latter race.

In size the G. Talamau animals appear very slightly smaller than the typical series from Korinchi (greatest length of skull 37.2—39.9 against 38.4—42; head and body 120—143 against 133—153; but the differences may be accidental or due to personal equation in measuring.

(For measurements see table on p. 319).

23. *Lariscus niobe niobe* (Thos.).

antea, p. 273; Journ. F. M. S. Mus., VIII, pt. 2, p. 35 (1918).

1 ♀. Gunung Talamau, 1,000 m. (3,250 feet), Ophir District, West Sumatra, 12th May, 1917 [No. E. J. 285.]

This specimen, which is not quite adult, has a large patch of pure white on the forebreast, otherwise it agrees with specimens from Korinchi and Bencoolen.

(For measurements see table on p. 319).

24. *Rattus sabanus tapanullus* Lyon.

Rattus vociferans tapanullus, Lyon, Proc. Biol. Soc. Washington, XXIX, 1916, p. 200.

3 ♂ ad., 2 ♂ imm., 7 ♀ ad., ♀ imm. Gunung Talamau, 500—1,300 m. (1,625—4,225 feet), Ophir District, 26th April—18th June, 1917 [Nos. E. J. 226, 249, 252, 266—7, 272, 277—8, 288, 324, 366—7, 361.]

With the exception of the obviously immature specimens, this series has the whole undersurface strongly tinged with creamy yellow, more so on the sides of the abdomen and throat, while the dividing line between the underparts and flanks is clear zinc orange. They are extremely close to specimens of *R. s. vociferans* from the central parts of the Malay Peninsula and only differ from topotypes from Trang in having a rather greater proportion of black in the pelage of the upper parts.

Rattus sabanus ululans, antea, p. 275, differs in its much duller upper pelage and chalk white under-surface, though it is not certain that the creamy yellow tint above referred is not sexual. In addition the tail appears to be considerably longer, exceeding 400 m.

R. sabanus fremens, from Lingga and Singkep is also a dull coloured animal but has a much shorter tail (324 mm). It is, however, known only from two specimens.

(For measurements see table on p. 320).

25. ***Rattus rajah ravus*** (Robinson and Kloss).

Antea, p. 276: Journ. F.M.S. Mus. VIII, pt. II, 1918, pp. 43, 59.

1 ♂ imm. 1 ♀ imm. Gunung Talamau, 1,300 m. (4,230 feet), Ophir District, West Sumatra, 28th May—8th June, 1917. [Nos. E. J. 314, 330.]

♂ — ? ad. Gunung Talamau, 1,200 m. (3,900 feet.) Ophir District, West Sumatra, 24th—26th May, 1917, [Nos. E. J. 296—7, 307.]

1 ♀ ad. Gunung Talamau, 500 m. (1,625 feet), Ophir District, West Sumatra, 28th April, 1917 [No. 237.]

The adults of this small series exactly agree in dimensions and other characters with the typical series from Korinchi. All have the white of the feet divided from the limbs by an ochreous band and all have an ochraceous gorget or indications of one. They are in fairly fresh pelage and are as fully as bright as specimens of typical *R. rajah surifer* in a similar stage of pelage. Judging from the analogy of *R. s. vociferans* this latter race is not improbably to be found in the north of Sumatra.

(For measurements see table on p. 320).

26. ***Rattus pellax similis*** (Robinson and Kloss).

Journ. F.M.S. Mus. VIII, pt. II, 1918, pp. 46, 47, 66.

1 ♂ ad., 8 ♀ ad., 4 ♂ sub-ad., 4 ♀ sub-ad., Gunung Talamau, 500 m. (1,625 ft.), Ophir District, West Sumatra, 29th April—3rd May, 1917 [Nos. 227—231, 236, 239, 244, 250, 253—256.]

5 ♂ imm., 5 ♀ ad., 2 ♀ imm. Gunung Talamau, 1,000 m. (3,250 ft.), 10th—14th May, 1917 [Nos. 268—271, 273—276, 279—282, 286—287.]

As the above list shows, Mr. Jacobson obtained a large series of this rat on the lower slopes of Gunung Talamau, where it does not appear to ascend above 1,000 m., its place above that level being taken by *R. rajah ravus*. A large proportion of the specimens are however immature and are difficult to discriminate.

Adults are however readily distinguished by the darker colour, above the bases of the fur chocolate or brownish, presence in the majority of specimens of an elongated greyish

brown ventral patch, total absence of any buff gorget. The white of the feet is always broadly discontinuous with the white of the upper thigh. A post-cervical collar is rarely developed.

The skull is always less massive and ridged than that of *R. r. rarus* and the zygomata are much more slender than that species; the posterior termination of the nasals usually, though not always, extends well beyond the fronto-maxillary suture.

Our original series did not comprise many adult specimens but it would appear that *R. p. similis* is always a smaller animal, with the hindfoot rarely as much as 40 mm., while that of *R. r. rarus* is never less, and generally about 44 mm.

The skull dimensions are also similar, for only very aged specimens of *R. p. similis* attain a greatest length of 46 mm. while equally old skulls of *R. r. rarus* measure at least 49.

It may here be noted that Miller (Proc. U. S. Nat. Mus. XXVI, 1903, pp. 463, 4) records certain specimens from Tapanuli Bay as *Rattus rajah lingensis* (*Mus lingensis*) with hind feet ranging from 36.4—40 mm. and with no indication of a dark collar. It is possible that these specimens may be referable to our race of *R. pellax*.

(For measurements see table on pp. 320, 321).

27. **Rattus orbus fraternus** (Robinson & Kloss).

Antea p. 277; Journ. F.M.S. Mus. VIII, pt. II, 1918, pp. 47, 61.

1 ♂ ad. Gunung Talamau, 2,800 m. (9,100 feet), Ophir District, West Sumatra, 3rd June, 1917 [No. E. J. 328.]

1 ♂ subad., 2 ♀ ad., 2 ♀ subad., 2 ♀ juv. Gunung Talamau, 1,850 m., 11-17th June, 1917 [Nos. E. J. 344, 345-5, 348, 354, 357-8.]

1 ♂ ad., 1 ♂ subad., 1 ♀ ad. Gunung Talamau, 1,300 m. (4,230 feet.), 2-11th June, 1917. [Nos. E. J. 326, 328, 334.]

2 ♂ ad., 2 ♀ ad. Gunung Talamau, 1,200 m. (3,900 feet), 24-25th May, 1917. [Nos. E. J. 292, 294, 302, 312.]

There is nothing special to be said about this series which agrees well with the original specimens from Korinchi. In all the breast patch is present or indicated by a patch of hairs of different character from the rest of the pelage. There is much variation in the spininess, though the specimen from the highest elevation is by no means the most woolly.

(For measurements see table on pp. 321, 322)

28. **Rattus hylomyoides** (Robinson & Kloss).

Antea, p. 277; Journ. Fed. Malay States, Mus., VIII, pt. II, 1918, p. 48, id. op. cit. VII, 1919, p.

♂ ad. Gunung Talamau, 2,800 m. (9,100 feet), Ophir District, W. Sumatra, 14th June, 1917. [No. E. J. 353.]

- 2 ♂ ad., ♂ subad.,
2 ♂ imm., ♀ ad., 2 ♀ imm. { Gunung Talamau, 1,850 m.
(6,000 feet), 12-17th June,
1917. [Nos. E. J. 343, 347,
349-50, 355-6, 359-60.]
- ♂ ad., ♂ subad., 2 ♂ imm.,
3 ♀ imm. { Gunung Talamau, 1,300 m.
(4,230 feet), 8th May-10th
June, 1917. [Nos. E. J.
315, 318-320, 323, 329,
335.]
- 3 ♂ ad., ♂ subad., ♂ imm., ♀ ad., Gunung Talamau,
1,200 m. (3,900 feet), 24-27th May, 1917. [Nos.
E. J. 293, 295, 303, 306, 310-11.]

This very extensive series on the whole agrees well with the original specimens from Korinchi Peak, where we did not obtain it below 7,300 feet. In the present series specimens obtained at 1,300 and 1,300 metres are much spinnier and less woolly than those from higher up, which is exactly paralleled by *Rattus orbus fraternus* and certain Javan species.

Fully adult specimens are rather more reddish above than the type and perhaps on the whole darker below, but the range of variation is great. As the measurements quoted postea show, the species attains greater dimensions than our series from Korinchi would indicate and there is therefore but little difference in size between it and *R. ins* (Bonh.), from the Malay Peninsula to which the existence of a highly spinous form also indicates its relationship. It is, however, at once separated from that species by its much darker and more uniform colour beneath, whereas *R. ins* has the underparts always more or less sharply defined from the side either grey or grey tinged with rufous buff.

(For measurement see table on p. 322).

29. ***Rattus whiteheadi whiteheadi*** (Thos.).

Antea p. 278; Robinson and Kloss, Journ. Fed. Malay States Mus. VIII, pt. II (1918), pp 49, 62.

2 ♀. Gunung Talamau, 500 m. (1,625 feet), Ophir District, West Sumatra, 31d May, 1917. [Nos. E. J. 238, 257.]

These specimens have clear grey bellies and on that account would be referable to the reputed form *R. mandus* (Lyon), Proc. U.S. Nat. Mus. XXXIV, p. 644. They are, however, not larger than other animals from further south as *R. mandus* is said to be and we therefore see no reason to change our views as regards this species and the name to be applied to it.

(For measurements see table on p. 323).

30. ***Rattus concolor ephippium*** (Jentink).

Robinson and Kloss, antea, p. 280; iid. op. cit. VIII, pt. II, pp. 56, 64.

2 ♀. Gunung Talamau, 400 m. (1,300 feet), Ophir District, West Sumatra, 25th April—4th May, 1917 [Nos. E. J. 225, 261].

One of these specimens is very much paler silvery grey beneath than other specimens, but our Sumatran material is indifferent. The specimens are of interest as being nearly topotypes of the subspecies which probably came from Singgalang, though Jentink (Notes Leiden Museum, 11, 1879, p. 15), does not give any exact locality.

(For measurements see table on p. 323).

31. ***Rattus rattus* subsp.**

1 ♀ ad. 1 ♀ imm. Port de Kock, 660 m. (3,120 feet), Padang Highlands, West Sumatra, 12th March 1917, 19th July 1917. [Nos. E. J. 222, 379]

1 ♂ juv. Sukamenanti, Ophir District, 200 m. (650 feet), 21st June, 1917. [No. E. J. 365]

Collector's external measurements. ad. head and body, 162; tail, 175; hindfoot, 34; ear, 19 mm.

Skull: greatest length, 39.0; zygomatic breadth, 18.8 mm.

The material is not sufficient to deal with this rat. The colour beneath of the adult is silver white not sharply defined from the sides. It does not appear to be referable either to *R. r. griseiventris* (Bonhote) or *R. r. argentiventris* (nobis) and is probably an example of the very variable form *R. r. neglectus* (Jentink).

32 ***Rattus baluensis korinchi* (Robinson and Kloss)**

Robinson and Kloss, Journ. Fed. Malay States Mus., VIII, pt. II, 1918, pp. 53, 54, 63.

1 ♂, 1 ♀ ad. Gunung Talamau (summit), 2,800 m. (9,100 feet), Ophir District, West Sumatra, 14th June, 1917 [Nos. E. J. 351, 352.]

These specimens agree closely with the type having the same long spineless pelage, with woolly underfur, ochraceous clay above, many of the longer hairs with broad black tips. Beneath greyish, the breast median line whiter, all the pelage grey at the base.

(For measurements see table on p. 323).

33 ***Rattus muelleri muelleri* (Jent.)**

Antea, p. 278.

Rattus muelleri, Robinson and Kloss, Journ. F. M. S. Mus., VIII, pt. II, 1918, pp. 51, 63.

1 ♂. Sukamenanti, 200 m. (650 feet), Ophir District, West Sumatra, 22nd June, 1917. [No. E. J. 1917.]

This specimen, which seems fully grown and fairly adult (teeth slightly worn, basioccipital suture not markedly open) though the cranial ridges are most strongly developed, comes from a locality quite close to the original type locality of the species. It agrees closely with Jentink's description both in dimensions and in colour but is smaller than our series from the south and has a paler area on the chest and throat (stained in the individual in question.)

The specimen establishes the fact that the original *R. muelleri* and *R. bullatus*, Lyon, are quite distinct forms, which was a matter of doubt owing to the age and imperfection of the skull of the original type of the former.

(For measurements see table on p. 323).

34 *Mus musculus* (Linn.)

1 ♂, 1 ♀ Fort de Kock, 920 m (3,000 feet), Padang Highlands, West Sumatra, 20th December, 1917. [Nos. E. J. 395 - 96.]

Of almost universal distribution, these are certainly true *M. musculus* and not *Leggadi*, J. E. Gray. We have not seen any previous record of this species for Sumatra

(For measurements see table on p. 323)

35. *Nyctocleptes sumatrensis insularis*, Thos

Nyctocleptes insularis, Thomas, Ann & Mag. Nat. Hist. (8), XVI, 1915, p. 58.

1 ♂, 4 ♀. Kota Gadung, Gunung Singgalang, 1,000 m. (3,250 feet), Padang Highlands, West Sumatra, 10th Sept.—31st Dec., 1917. [Nos. L. J. 382, 387, 391--2, 394.]

1 ♂ imm. Si Anok, Agam, Padang Highlands, 950 m (3,100 feet), West Sumatra, 9th November, 1917. [No. E. J. 390.]

Most of these specimens are fully adult though not aged, as is usual with Bamboo Rats of this species the younger specimens are more brightly coloured, with more rufous cheeks

(Collector's external measurements taken in the flesh: ♂ head and body, 335 (320)*; tail, 145 (130), hindfoot, 61 (57.5); ear 17 (17) mm

4 ♀ head and body 338—398; tail, 140—181; hindfoot, 62--64.5, ear 18—20 mm.

Skull measurements ♂ zygomatic breadth, 54; height of crown from alveolus of *m.*³, 31.8, occipital plane, height from baston, 26.2 mm.

4 ♀: condylo-basal length, 75.1—80 (71)†; zygomatic breadth, 58—61 (52); height of crown from alveolus of *m.*³,

* Measurements in parentheses those of a male of the typical series from Deli, East Sumatra

† Measurements in parentheses are those of the type of *N. s. insularis*

31.2—33.1 (27); occipital plane, height from basion, 27—28.9 (24).

This insular race was described by Mr. Thomas from a series of four adults from Deli, East Sumatra, and is stated to be smaller than the mainland form *N. s. sumatrensis*, Hardwicke, condylobasal length in females 71 mm. against at least 78 mm. in the Malayan race. As the above measurements show, our West Sumatran series does not bear out these statements and there must evidently be some intergradation.

36. **Tragulus kanchil kanchil** (Raffles).

Tragulus kanchil, Miller. Proc. U. S. Nat. Mus. XXVI, 1903, pp. 442, 446.

1 ♀ Lubuk Landur, Ophir District, 200 m. (650 feet), West Sumatra, 2nd May, 1917 [No. E. J. 251.]

A quite immature specimen, posterior molars not erupted.

37. **Manis javanica**, Desm.

Manis javanica Desmarest, Mamm, p. 377 (1822).

sk. Fort de Kock, Padang Highlands, 960 m. (3,120 feet), West Sumatra, [No. E. J. 221.]

Longitudinal rows of scales round the body, 17; total number of scales in the longitudinal line, 61; number of scales in the upper median line of tail only, 29.

ADDENDA.

26a. **Rattus bukit** (Bonh.), subsp.

♀. Sukamenanti, Ophir District, 200 m. (650 feet), West Sumatra, 22nd May, 1917 [No. E. J. 367.]

Head and body, 150, tail, 185, hindfoot 29.5, ear 19.5 mm.

This specimen lacks skull and it is therefore inexpedient to attempt more precise identification.

MEASUREMENTS OF Squirrels FROM WEST SUMATRA.

| Species and Locality | Sex | Head and Body | | | Tail | Hind foot | Ear | SKULL | | | | | | | No | REMARKS |
|--|-----|---------------|-------|------|------|-----------|-----|-----------------|------------------------|----------------|----------|-----------------|---------------------|----------------------|------|----------------------------------|
| | | | | | | | | Greatest length | Condyle basilar length | Palatal length | Diastema | Upper molar row | Median nasal length | Inter orbital length |  |  | Zygomatic breadth |
| <i>Callosciurus vittatus tapanulius.</i> | | | | | | | | | | | | | | | | |
| Lubuk Landur Ophir Dist 250 m | ♂ | 205 | 190 | 40 | 16 | | | 49.5 | 43.1 | 22.0 | 12.7 | 9.2 | 14.9 | 17.3 | 30.0 | E J 245 Adult 362 Subadult |
| Do | ♀ | 190 | 173 | 43 | 15.5 | | | 40.0 | 41.7 | 20.8 | 11.0 | 9.9 | 15.2 | 16.9 | 28.9 | |
| <i>Callosciurus nigrovittatus bocki.</i> | | | | | | | | | | | | | | | | |
| Gunung Talamau Ophir Dist 1200 m | ♂ | 170 | 190 | 39 | 15.5 | | | 43.5 | 38.9 | 18.4 | 9.9 | 8.7 | 12.9 | 16.8 | 27.0 | 289 Subadult 340 Adult |
| Do | ♀ | 179 | 165 | 42 | 14.5 | | | 44.9 | 38.8 | 18.6 | 9.9 | 8.6 | 13.0 | 17.0 | 28.1 | |
| <i>Tomomites hippurus hippurosus.</i> | | | | | | | | | | | | | | | | |
| Air Taman, Gunung Pasaman Ophir Dist .. | ♂ | 250 | 220 | 63.5 | 19 | | | 60.1 | 54.1 | 27.8 | 16.3 | 10.2 | 18.8 | 21.9 | 37.3 | 363 Adult |
| <i>Tomomites tenuis modestus.</i> | | | | | | | | | | | | | | | | |
| Fort de Koch, Padang, 960 m | ♀ | 139.5 | 121.5 | 30 | 12.5 | | | 39.2 | 33.1 | 17.0 | 8.8 | 7.7 | 12.8 | 12.1 | 22.8 | 220 Adult |

MEASUREMENTS OF SQUIRRELS FROM WEST SUMATRA—Cont.

| Species and Locality | Sex | Head and Body | Tail | Hind foot | Ear | SKULL | | | | | | | | No | Remarks. |
|------------------------------|-----|---------------|-------|-----------|------|----------------|-------------------|----------------|----------|-----------------|---------------------|----------------------|-------------------|---------------|----------|
| | | | | | | Cranial length | (condylar length) | Palatal length | Diastema | Upper molar row | Median nasal length | Inter-orbital length | Zygomatic breadth | | |
| <i>Tomomys tenuis</i> | | | | | | | | | | | | | | | |
| altitudinis. | | | | | | | | | | | | | | | |
| Gunung Talamau, 1700 m | ♂ | 120 | 115 | 35 | 14 | 37.2 | 30.0 | 15.6 | 8.3 | 7.2 | 11.3 | 11.4 | 20.3 | E J Adult | |
| Do | ♂ | 142.5 | 118.5 | 34.5 | 13.5 | 39.9 | 32.2 | 16.1 | 9.2 | 7.3 | 11.0 | 12.4 | 22.0 | 264 Do | |
| Do | ♂ | 135 | 119 | 34.5 | 13 | 39.0 | 31.1 | 16.8 | 9.0 | 7.1 | 11.8 | 12.0 | 21.1 | 265 Do | |
| Do | ♂ | 132.5 | 115.5 | 33.5 | 11.5 | 36.3 | 30.1 | 16.4 | 9.1 | 7.4 | 11.2 | 12.1 | 21.0 | 268 Do | |
| Do | ♂ | 129 | 110 | 34 | 13 | 36.0 | 30.7 | 16.2 | 9.0 | 7.3 | 11.6 | 11.7 | 20.9 | 269 Do | |
| Do | ♀ | 32 | 35 | 32 | 13 | 37.5 | 30.0 | 15.9 | 8.6 | 7.7 | 11.7 | 12.2 | 21.5 | 300 Do | |
| Do | ♀ | 139 | 110 | 31 | 14 | 39.3 | 32.3 | 16.0 | 9.2 | 7.3 | 12.1 | 12.9 | 23.5 | 301 Do | |
| Do | ♀ | 142 | 113 | 33 | 14 | 39.5 | 32.8 | 16.2 | 9.4 | 7.3 | 12.1 | 12.5 | 21.9 | 304 Do | |
| Do | ♀ | 143 | 124 | 36.5 | 16 | 39.5 | 33.1 | 16.9 | 9.7 | 7.8 | 12.1 | 13.0 | 23.1 | 305 Do | |
| Do | ♀ | 134 | 110 | 36 | 14.5 | 39.5 | 32.2 | 16.1 | 9.1 | 7.2 | 11.9 | 12.1 | 22.4 | 309 Do | |
| Do | ♀ | 133 | 110 | 32.5 | 14 | 38.9 | 32.1 | 16.1 | 9.1 | 7.2 | 12.0 | 11.9 | 22.1 | 331 Do | |
| Do | ♀ | 125 | 104 | 31.5 | 11 | 37.5 | 31.3 | 16.0 | 9.0 | 7.5 | 11.1 | 11.2 | 21.3 | 341 Do | |
| Do | ♀ | 134 | 111 | 34 | 15 | 39.0 | 32.1 | 16.2 | 9.2 | 7.5 | 12.0 | 12.9 | 22.5 | 342 Do | |
| Do | ♀ | 136 | 100 | 34 | 15 | 38.9 | 31.5 | 16.1 | 9.2 | 7.2 | 11.7 | 12.2 | 22.0 | 347 Do | |
| Do | ♀ | 137 | 111 | 34.5 | 14 | 38.9 | 31.5 | 16.1 | 9.2 | 7.2 | 11.7 | 12.2 | 22.0 | 348 Do | |
| <i>Lamascus niobe</i> | | | | | | | | | | | | | | | |
| Gunung Talamau, 1700 m | ♂ | 165 | 100 | 45 | 16.5 | 47.1 | 39.0 | 21.2 | 12.2 | 9.3 | 13.2 | 12.3 | 26.0 | 285 Subadult. | |

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MEASUREMENTS OF RATS FROM WEST SUMATRA

| Species and Locality. | Sex | Head and body | Tail | Hind-foot | Ear | SKULL | | | | | | | | No | REMARKS. |
|---|-----|---------------|------|-----------|------|-----------------|------------------------|----------|-----------------|-------------------------|---------------------|--------------------------|-------------------|------|----------|
| | | | | | | Greatest length | Condyle-basilar length | Diastema | Upper molar row | Length palatal foramina | Median nasal length | Breadth combined nasals. | Zygomatic breadth |  |  | Length lower mandible |
| <i>Rattus sabanus tapanulius</i> | | | | | | | | | | | | | | | |
| Gunung Talamau, Ophir Dist | ♂ | 238 | 357 | 48 | 27 | 56.3 | 43.2 | 15.1 | 10.3 | 7.1 | 20.7 | 6.0 | 26.1 | 31.5 | Adult |
| Do | ♂ | 240 | 397 | 49 | 27 | 56.0 | 48.1 | 15.0 | 9.9 | 8.3 | 22.1 | 5.8 | 24.2 | 32.0 | Do |
| Do | ♀ | 242 | 370 | 47 | .. | 57.1 | 49.1 | 15.1 | 10.0 | 8.0 | 21.6 | 6.3 | 25 (app) | 33.6 | Do |
| Do | ♂ | 246 | 414 | 50 | 28 | 56.9 | 48.8 | 14.8 | 10.0 | 7.1 | 22.0 | 6.0 | 25.5 | 31.9 | Do |
| Do | ♂ | 239 | 395 | 48.5 | 26 | 56.6 | 48.8 | 15.0 | 10.1 | 7.3 | 22.3 | 6.0 | 25.2 | 32.9 | Do |
| Do | ♀ | 224 | 374 | 50 | 25 | 56.1 | 48.1 | 14.9 | 10.1 | 8.1 | 20.3 | 6.0 | 24.8 | 32.9 | Do |
| Do. 1300 m | ♂ | 257 | 379 | 46.5 | 26.5 | 58.8 | 50.7 | 16.1 | 10.7 | 7.9 | 23.8 | 7.0 | 26.7 | 35.0 | Do |
| Do | ♀ | 246 | 387 | 48 | 28 | 57.0 | 49.9 | 15.9 | 9.9 | 9.2 | 23.3 | 6.1 | 26.9 | 34.3 | Do |
| Do | ♂ | 247 | 385 | 50 | 27 | 56.0 | 48.5 | 15.0 | 10.0 | 8.0 | 22.9 | 6.2 | 24.7 | 32.9 | Do |
| <i>Rattus rajah ravus</i> | | | | | | | | | | | | | | | |
| Gunung Talamau 1200 m | ♂ | 210 | 220 | 43 | 24 | 47.8 | 41.2 | 14.0 | 6.8 | 6.1 | 18.1 | 5.1 | 20.6 | 26.1 | Aged. |
| Do | ♀ | 207 | 186 | 40 | 22.5 | .. | .. | 13.7 | 6.9 | 7.8 | 17.9 | 5.1 | 21.8 | 27.2 | Adult. |
| Do 500 .. | ♀ | 176 | 192 | 39.5 | 23 | 44.1 | 36.3 | 12.7 | 6.5 | 7.1 | 16.8 | 5.0 | 19.5 | 24.1 | Do. |
| <i>Rattus pellax similis</i> | | | | | | | | | | | | | | | |
| Gunung Talamau, 500 m | ♀ | 182 | 186 | 37 | 23 | 43.9 | 37.0 | 12.2 | 7.0 | 5.6 | 16.9 | 4.5 | 19.8 | 24.3 | Do |
| Do. | ♀ | 159 | 170 | 37 | 22 | 40.1 | 33.2 | 10.8 | 6.7 | 5.6 | 15.2 | 4.3 | .. | 21.8 | Do |

MEASUREMENTS OF RATS FROM WEST SUMATRA—Cont.

| Species and Locality. | Head and body | | | | | Tail | Hind-foot | Ear | Skull | | | | | | | No | REMARKS |
|-----------------------------|---------------|-----------------|-------------------------|-----------|-----------------|------|-----------|------|-------------------------|---------------------|-------------------------|-------------------|-----------------------|------|-------|----|---------|
| | Sex | Greatest length | Cunth in basilar length | Diastrama | Upper molar row | | | | Length palatal foramina | Median nasal length | Breadth combined nasals | Zygomatic breadth | Length lower mandible | | | | |
| <i>Rattus pellax</i> | | | | | | | | | | | | | | | | | |
| <i>similis</i> .—cont. | | | | | | | | | | | | | | | | | |
| Gunung Telaman, 500 m | ♂ | 183 | 175 | 37 | 22 | 43.4 | 36.9 | 12.4 | 6.8 | 5.9 | 16.9 | 4.7 | . | 23.4 | Adult | | |
| Do | ♀ | 154 | 158 | 37.5 | 21.5 | 40.1 | 33.5 | 10.6 | 6.8 | 5.2 | 14.8 | 4.0 | 17.9 | 21.2 | Do | | |
| Do | ♂ | 153 | 164 | 36.5 | 21 | 38.9 | 32.1 | 10.1 | 6.9 | 5.0 | 14.3 | 4.0 | 17.8 | 21.3 | Do | | |
| Do | ♂ | 160 | 163 | 37 | 22 | 39.3 | 33.0 | 10.9 | 6.5 | 5.2 | 14.9 | 4.2 | 18.0 | 21.2 | Do | | |
| Do | ♂ | 180 | 191 | 39 | 20.5 | 44.8 | 38.0 | 12.8 | 6.8 | 5.9 | 17.0 | 4.8 | 20.2 | 24.0 | Aged | | |
| Do | ♂ | 235 | 205 | 38 | 22.5 | 46.1 | 38.9 | 13.1 | 7.1 | 6.0 | 18.0 | 4.8 | 20.3 | 24.0 | Do. | | |
| Do | ♂ | 178 | 170 | 36 | 22 | 42.2 | 36.1 | 12.0 | 6.6 | 5.8 | 16.3 | 4.8 | 19.0 | 23.0 | Adult | | |
| Do | ♂ | 190 | 189 | 37.5 | 22 | 43.9 | 37.8 | 12.3 | 7.1 | 5.7 | 17.1 | 4.9 | 20.1 app | 24.9 | Aged | | |
| 1000 m | ♂ | 179 | 195 | 39 | 22 | 44.9 | 37.8 | 12.2 | 7.1 | 6.0 | 16.9 | 5.0 | 20.0 | 24.0 | Do | | |
| Do | ♂ | 159 | 181 | 37 | 21 | 42.5 | 36.2 | 11.8 | 6.3 | 5.7 | 15.4 | 4.3 | 19.0 | 23.0 | Adult | | |
| Do | ♂ | 186 | 179 | 40 | 22.5 | 44.1 | 36.9 | 12.1 | 6.8 | 5.5 | 17.8 | 4.3 | 19.2 | 23.9 | Do | | |
| Do | ♂ | 171.5 | 164.5 | 35.5 | 21.5 | 42.1 | 35.2 | 11.3 | 6.9 | 5.7 | 15.2 | 4.9 | 19.2 | 23.1 | Do | | |
| <i>Rattus orbus</i> | | | | | | | | | | | | | | | | | |
| <i>fraternus</i> . | | | | | | | | | | | | | | | | | |
| Gunung Telaman, Ophir | ♂ | .. | .. | .. | .. | 40.1 | 33.8 | 10.2 | 6.6 | 7.0 | 15.2 | 4.9 | 17.2 | 21.1 | Aged | | |
| Dist 2800 m | ♀ | 137 | 215 | 30 | 20.5 | 37.3 | 30.5 | 9.2 | 6.8 | 5.8 | 14.2 | 4.3 | 16.9 (app) | 20.0 | Adult | | |
| Do 1850 m | ♀ | 132 | 198 | 29 | 20 | 36.0 | 29.4 | 8.6 | 6.8 | 5.8 | 13.2 | 4.1 | 16.8 | 19.1 | Do | | |
| Do | ♂ | 153 | 224 | 32 | 21 | 39.2 | 33.1 | 10.1 | 6.8 | 6.1 | 15.0 | 4.4 | 17.3 | 20.1 | Do | | |
| Do 1300 m | ♂ | 151 | 225 | 30 | 19.5 | 38.9 | 33.0 | 10.1 | 7.0 | 6.8 | 14.2 | 5.0 | 17.0 | 20.5 | Do | | |

MEASUREMENTS OF RATS FROM WEST SUMATRA—Cont.

| Species and Locality | Sex | Head and body | Tail | Hind foot | Ear | SKULL | | | | | | | | No | REMARKS. |
|--------------------------------------|-----|---------------|------|-----------|------|-----------------|-----------------|----------|-----------------|-------------------------|---------------------|-------------------------|-------------------|------|----------|
| | | | | | | Crest or length | Condyle basilar | Diastema | Upper molar row | Length palatal foramina | Median nasal length | Breadth combined nasals | Zygomatic breadth |  |  | Length lower mandible |
| Rattus orbus fraternus. -cont | | | | | | | | | | | | | | | |
| Gunung Talamaq, Ophir Dist | ♂ | 130 | 223 | 30.5 | 22 | 39.5 | 32.6 | 10.0 | 7.1 | 6.6 | 15.0 | 4.7 | 18.0 | 20.8 | Adult |
| Do | ♂ | 144 | 203 | 31.5 | 21 | 37.2 | 30.7 | 8.9 | 6.5 | 6.1 | 13.2 | 4.2 | 16.2 | 19.3 | Do |
| Do | ♀ | 127 | 196 | 30.5 | 19.5 | 35.8 | 29.0 | 5.5 | 6.0 | 6.0 | 12.8 | 4.4 | 16.3 | 19.8 | Do |
| Do | ♀ | 130.5 | 206 | 30.5 | 19.5 | 37.7 | 31.1 | 6.7 | 6.5 | 6.3 | 14.0 | 4.2 | 16.3 | 19.6 | Do |
| Rattus hylomysoides. | | | | | | | | | | | | | | | |
| Gunung Talamaq, Ophir Dist | ♂ | 140 | 131 | 29 | 19.5 | 35.0 | 29.1 | 5.0 | 6.2 | 5.0 | 11.0 | 3.9 | 16.1 | 18.0 | Do |
| Do | ♂ | 143.5 | 142 | 28 | 21 | 35.1 | 29.9 | 7.0 | 6.1 | 5.1 | 11.3 | 3.8 | 17.2 | 19.6 | Do |
| Do | ♂ | 147 | 140 | 30.5 | 20 | 36.3 | 30.2 | 6.2 | 6.3 | 5.3 | 11.2 | 3.9 | 17.0 | 20.0 | Do |
| Do | ♂ | 125 | 134 | 29.5 | 19 | 33.3 | 28.9 | 5.3 | 5.8 | 5.0 | 11.2 | 3.7 | 16.0 | 18.3 | Do |
| Do | ♂ | 135 | 156 | 28.5 | 20 | 37.0 | 31.4 | 9.0 | 6.0 | 5.2 | 12.2 | 4.0 | 16.3 | 20.1 | Aged. |
| Do | ♂ | 143 | 141 | 30 | 21.5 | 35.6 | 30.4 | 9.2 | 5.5 | 5.1 | 11.0 | 4.0 | 16.4 | 19.2 | Adult |
| Do | ♂ | 146 | 156 | 31.5 | 20.5 | 37.5 | 31 | 9.7 | 6.5 | 5.1 | 11.8 | 4.1 | 16.7 | 20.2 | Do |
| Do | ♂ | 128 | 128 | 29.0 | 20.5 | 34.2 | 29.0 | 8.6 | 5.1 | 5.0 | 11.2 | 3.5 | 16.4 | 18.4 | Aged |
| Do | ♂ | 110 | 127 | 29.5 | 20 | 32.9 | 27.1 | 8.1 | 5.8 | 4.6 | 10.2 | 3.5 | 15.1 | 17.5 | Adult |
| Do | ♂ | 115 | 135 | 31.5 | 20.5 | 34.5 | 28.9 | 5.5 | 6.0 | 4.6 | 11.2 | 3.6 | 15.6 | 18.5 | Do |

MEASUREMENTS OF RATS FROM WEST SUMATRA—Cont.

| Species and Locality | Sex | Head and body | | | Tail | Hind foot | Ear | SKULL | | | | | | | No | REMARKS |
|-----------------------------------|-----|---------------|--------------|---------------------|------|-----------|------|-----------------|--------------------------|----------|-----------------|-------------------------|---------------------|------------------------|-----|-----------|
| | | Snout to eye | Snout to ear | Snout to tip of ear | | | | Greatest length | Length in basilar length | Diameter | Upper molar row | Length palatal foramina | Median nasal length | Breadth combined nares |  |  | Zygomatic breadth | Length lower mandible |
| Rattus whiteheadi. | | | | | | | | | | | | | | | | |
| Gunung Talamau 500 m | ♀ | 112 | 95 | 2-1 | 16.5 | 33.1 | 7.9 | 6.2 | 4.9 | 11.0 | 3.6 | 16.8 | 17.5 | 1-8 | 238 | Sub adult |
| Do | ♀ | 115 | 95 | 25.5 | 13 | 32.1 | 7.8 | 5.6 | 4.4 | 11.0 | 3.7 | 15.2 | | | 257 | Adult |
| Rattus concolor ephippium. | | | | | | | | | | | | | | | | |
| Gunung Talamau 400 m | ♀ | 110 | 23 | 24 | 16.5 | 29.2 | 7.3 | 5.7 | 6.0 | 10.2 | 3.1 | 14.2 app | | | 225 | Do |
| Do | ♀ | 115 | 123 | 41.3 | 16 | 31.6 | 7.6 | 5.4 | 5.3 | 11.1 | 3.2 | 14.2 | | | 261 | Do |
| Rattus baluensis korinchi | ♂ | 169 | 209 | 31.7 | 22 | 41.9 | 11.9 | 5.0 | 8.3 | 16.3 | 4.9 | 20.2 | | 23.8 | 351 | Do |
| | ♀ | 173 | 209 | 32.0 | 22 | 42.1 | 11.1 | 5.3 | 5.1 | 5.4 | 5.0 | 22.9 | | 25.0 | 352 | Aged |
| Rattus muelleri muelleri. | | | | | | | | | | | | | | | | |
| Sukamenanti 200 ft Ophir Dist | ♂ | 192 | 74 | 45 | 19.5 | 47.1 | 12.3 | 9.7 | 7.8 | 18.1 | 5.3 | 23.6 | | 27.2 | 366 | Sub adult |
| Mus musculus. | | | | | | | | | | | | | | | | |
| Fort de Kock Padang Highlands | ♀ | 74 | 70 | 15 | 11 | 18.8 | 4.9 | 3.5 | 4.2 | | 2.1 | 10.0 | | 9.5 | 395 | Adult |
| Do | ♂ | 88 | 81 | 16 | 12 | 20.2 | 4.6 | 3.7 | 4.8 | 8.0 | 2.0 | 10.3 | | 10.7 | 396 | Do |

XXXIV. NOTES ON THE VERTEBRATE FAUNA OF THE PAHANG-JOHORE ARCHIPELAGO.

Plates VI—VII.

By H. C. ROBINSON.

I. A LIST OF BIRDS FROM PULAU TINGGI.

Pulau Tinggi is a mountainous island on the East Coast of Johore from which it is separated by about ten miles of sea carrying but little more than ten fathoms. In maximum length it is about seven miles and in breadth about three miles while the central conical peak, which is visible from a great distance, is a little over two thousand feet in height.

On the West and South-west sides there are several small bays which are inhabited by a small mixed Malay-Jakun population which has much decreased of late years, owing to the ravages of small-pox, malaria and cholera. They are very poverty-stricken and subsist on fishing, on the collection of pearl shell (*gewang*) and edible birds nests on the surrounding islets and on the produce of somewhat indifferent coconut plantations.

There are numerous small islets in the immediate vicinity but none of any importance.

There is good anchorage for small craft between an outlying reef and the shore in one or two places on the South and Southwest Coasts but on the North and East the coast is steep-to. In the S. W. monsoon water is scarce and bad.

Some forty or more years ago the island in its higher parts was devastated by a cyclone and much of the jungle blown down. The dominant tree on the hills is now *pulai* (*Alstonia scholaris*) but there is much rattan and a certain amount of bamboo. The littoral vegetation is of the type common to all Malayan islands which are not fringed with mangrove.

Except for the narrow belt of coconut cultivation on the shore and one or two small clearings for vegetables, etc., on the sides of the hills the island is covered with heavy jungle throughout, in contradistinction to Pulau Aor, the most seaward island of the group, which is planted with coconuts practically to the summit (Plate VI, upper figure) and Pulau Sri Buat, which is nearest to the Johore-Pahang Coast (Plate VII, lower figure) which is bare and rocky with patches of coarse wiry grass and thin scrub.

The mammalian fauna is poor and uninteresting, consisting of a kra monkey (*Macaca irus laetus*), two rats, both of which are commensal on man, a squirrel of the *vittatus* type

and two or three bats, though no *Pteropus* has as yet been obtained. The Duyong is occasionally found in one or two of the bays.

Among reptiles *Python*, *Dryophis*, a species of *Dipsadomorphus*, two species of *Draco*, *Calotes cristatellus*, *Mabuia multifasciata*, *Lygosoma olivaceum*, *Lygosoma scotophilum* and two species of *Hemidactylus* have been met with.

Lepidoptera on all our visits were scarce and of no special interest.

The island has been visited by us on several occasions during the last fifteen years for periods varying from a few hours to four or five days and the following species of birds have been collected on it; I have not attempted to emulate Dr. H. C. Oberholser and provide the birds each with a separate subspecific name and indeed can distinguish few if any differences between the specimens from the islands and those from the adjacent mainland.

No list of the birds has hitherto been published.

1. *Osmotreron vernans* (Linn.)

2. *Carpophaga aenea* (Linn.)

3. *Myristicivora bicolor* (Scop.)

All three species extremely common.

4. *Chalcophaps indica* (Linn.)

Fairly numerous on the higher ground.

5. *Caloenas nicobarica* (Linn.)

Not common and hard to obtain.

6. *Sterna bergii pelecanoides*, King.

Common round the island.

7. *Sterna melanauchen melanauchen*, Temm.

Also common and breeding on adjacent rocky islands in June, July and August (Plate VI, lower figure portrays one breeding station between the two islands of the Sri Buat Group)

8. *Sterna anaetheta anaetheta*, Scop.

Very common, breeding in enormous numbers on many of the adjacent rocks, especially on Tokong Burong, between Sri Buat and Tioman.

9. *Aegialitis alexandrina peroni* (Bp.)

antea, p. 139.

A breeding pair shot on June 21st, 1915.

We have dealt with this species or race at length elsewhere; it is fairly common in the summer months throughout the Johore-Pahang archipelago.

10. *Demigretta sacra* (Gm.)

Extremely common.

11. *Fregata ariel* (Gould.)

Fairly common; one was obtained in June 1908.

12. *Haliaetus leucogaster* (Gm.)

13. *Haliastur indus intermedius*, Gurney.

Both very common though specimens from this locality have not been preserved.

14. *Halcyon chloris* (Bodd.)

Two adult males were shot on Pulau Tinggi on 18th and 20th June 1915. Wing, 107, 105, exposed culmen, 48, 46 mm.

I am unable to agree with Mr. Oberholser in the conclusions arrived at in his recent "Revision of the subspecies of the White-Collared Kingfisher," *Sauropatis chloris* (Boddaert). (Proc. U. S. Nat. Mus. vol. 55, 1919, pp. 351—395).

I consider that the whole of the Indo-Malayan forms eastwards to the Philippines should be regarded as one species and that division into subspecies is impractical and not justified by the facts.

Our series of the form listed by Mr. Oberholser under the name *Sauropatis chloris armstrongi*, vastly exceeds that in the United States National Museum and amongst them are to be found all the colour variations assigned to that race, to *S. c. cyanescens*, and to *S. c. palmeri*, from Java.

As regards dimensions it would appear from the quoted measurements that *S. c. cyanescens* is a slightly larger form than *S. c. armstrongi* but on the other hand seven birds from near Deli, N. E. Sumatra, measure 96—102 in wing and on this account would have to be assigned to the latter form, thus doing violence to Dr. Oberholser's geographical distribution. Birds from West Sumatra run up to 113 mm. while we have specimens from the mainland of the Malay Peninsula and from Langkawi which measure 109 and 111 mm.

To anyone familiar with the bird, in life, it is incredible that the communities living on opposite sides of narrow straits should possess any real subspecific distinctness and I cannot therefore admit that birds from N. E. Sumatra are distinct from those from the N. W. Malay Peninsula or that the opposite sides of the Sunda Straits are inhabited by two different forms, *S. c. cyanescens* and *S. c. palmeri*, Oberholser.

15. *Hemiprocne longipennis harterti*, Stresemann.

Nov. Zool. XX, 1913, p. 339; Oberholser, Bull. U. S. Nat. Mus. 98, 1917, p. 28 (Anambas).

One female shot on 20th June, 1915. Wing 158 mm.

16. *Collocalia franciosa inexpectata*, Hume.

Oberholser, Proc. Aad. Nat. Sci. Philad. 1906, pp. 200, 201.

A Swift, which I refer to this form, was found breeding on Tokong Gantang, a group of rocks S. W. of Pulau Tinggi, on June 21st, 1915, and a single male shot.

The bird has hardly any trace of feathering on the tarsus, is rather dark above, with greenish gloss, the bases of the loreal feathers are pure white and the pale rump band, with dark shafts to the feathers, is clearly defined. The wing is 118 mm.

Four birds, one male and three females, from the adjacent island of Pulau Tioman (birds from which island Oberholser refers to this species) have the wing immeasurable, as they are all in moult, but probably exceeding 110 mm. in all cases; one has no trace of pale rump band, in one it is very clear and in the two others very ill-defined. All are darker than a series of the closely related *C. f. germaini*, Oust. (*C. f. merguensis*, Hartert) from the islands in the Bandon Bight, further North.

There seems to be no reason why the Tokong Gantang bird should not be referred to the near-by *C. fucifaga amechana*, Oberholser, from the Anamba islands, described from two specimens, while the bird from Pulau Tioman, without rump band, would appear to agree with *C. fuciphaga vestita*, as defined by Oberholser, who records a specimen from Tanjong Silantai, East Johore, about fifty miles distant.

Under the circumstances I am in agreement with Ogilvie Grant, who thinks that too many races of this group have been described on insufficient material and am not therefore prepared to admit that more than one race of this Swift exists on the coasts of Johore and Pahang to which I consider the above name applies.

17. *Hypothymis azurea prophata* Oberholser.

Oberholser, Proc. U. S. Nat. Mus. 39. 1911, p. 597.

A single female, shot on June 19th, 1915, agrees with others from the mainland of the Malay Peninsula but has the wing rather long, 71.5 mm.

18. *Pycnonotus plumosus chirolethis*, Oberholser.

Bull. U. S. Nat. Mus. 98. 1917, p. 41 (Anamba Islands).

Two males shot on 17th and 19th June have the wing 91 and 86 mm., measured flat. Oberholser's type series from the Anambas which are stated to differ only in size from the typical birds from Singapore and the Malay Peninsula have the wings recorded as from 83.5 to 90.5 measured across the curve (say 86 to 93 measured flat) while a very large series from all parts of the Malay Peninsula range from 79-87 mm.

The above two specimens have the angle of the wing and the axillaries rather brighter golden buff than in most specimens from the mainland.

The race is therefore just recognizable.

"Iris red, bill black, feet pinkish brown."

19. *Kittacincla malabarica macrurus* (Gm.).

Numerous adult specimens from Pulau Tinggi and the adjacent islands and a very large series from the whole range of the Malay Peninsula and from Siam and Cochin China exhibit variations in colour among birds from the same locality which are comparable in degree with the birds from the Anambas described by Mr. Oberholser on not very large material as *Kittacincla malabarica ochroptila* and *K. m. heterogyna*, loc. cit. supra, pp. 51—4x.

As regards size it would appear that the former race is larger than any of about fifty adults from our series but the average difference is only about 4 mm., which may quite possibly be due to the great difference in the numbers of the two series. I cannot but think that in faunal papers of this kind no good purpose is served by describing subspecies of such extreme tenuity unless the whole species over its whole range is adequately discussed.

We are compelled to use the name *malabarica* disinterred by Dr. Richmond, though fortunately it does not alter the name of the Malayan and eastern race, unless the Pulau Condor bird should prove distinct. In this event it will probably be necessary to give a new subspecific name to the Sumatran and Malayan birds. Hartert has fixed the type locality of *K. tricolor* (Vieill.) as "India"; this name therefore lapses as a synonym of *K. malabarica* (Scop).

20. *Gracula javana javana* (Cuv.)

A male and two females shot in June 1908 and June 1915 have the wings 183, 181, 188 mm. I cannot distinguish them from specimens from the whole of the Malay Peninsula, from Borneo and from Sumatra though unfortunately we have not been able to compare them with the typical form from Java.

21. *Aplonis panayensis strigata* (Horsf.)

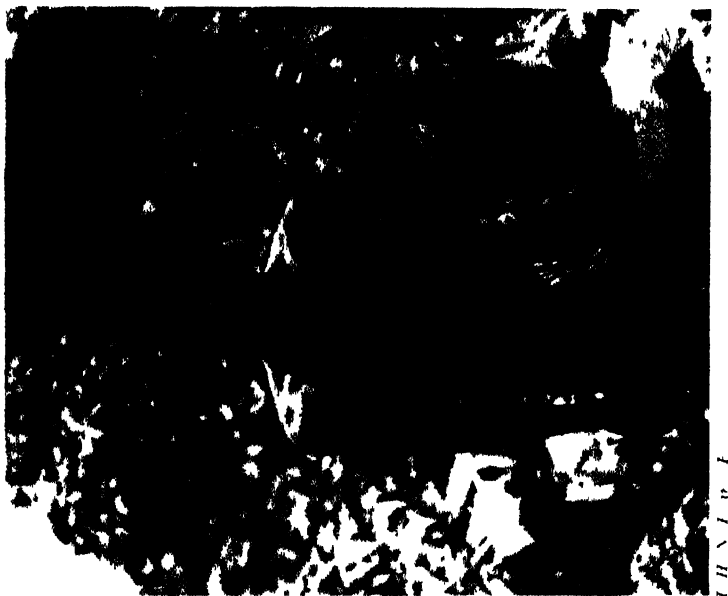
An immature male in the striped plumage collected on June 18th, 1919, has a wing of 96 mm. The bill is not specially large, and the specimen has to be referred to the mainland form, which is identical with that of Java and Sumatra. The birds from Pulau Aor, on the other hand, have somewhat larger bills and on an average rather longer wings. Possibly they are to be referred to the Anamba race, *Lamprocorax panayensis heterochlorus*, Oberholser, loc. cit. supra, which was described on two males with wings, 108 and 112 mm.



J. H. N. Jones, Photo



SAKAI OF THE KAMPAR RIVER ABOVE COPENG, PERAK.



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SAKAI OF THE KAMIPAR RIVER ABOVE GOPENG, PFRAN



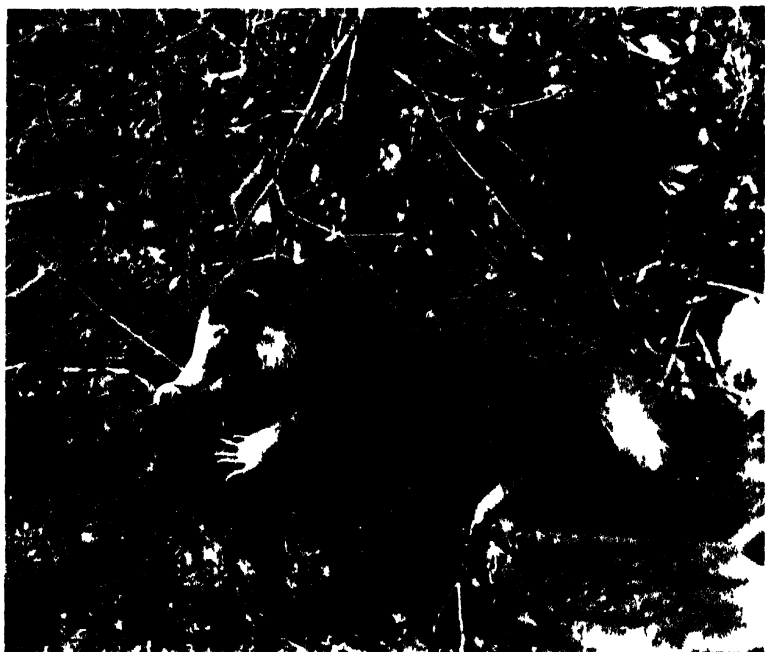
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SAKAI OF THE KAMPAR RIVER ABOVE GOPENG, PERAK.



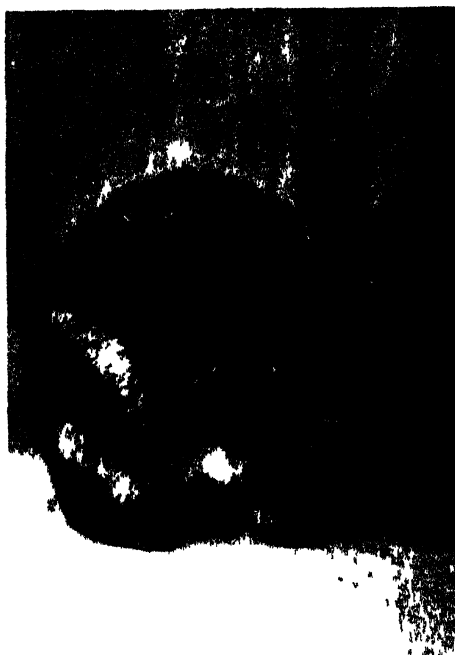
THE N E 105 113

MOUNTAIN SAKAI, ULU KAMPAR, PERAK



ARCTONYX HOEVENI (HUBR.)

100



100

NESOLAGUS NETSCHERI (SCHLEG.).

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PLATE 1

BATU BIRHAIA, PULAU AOR

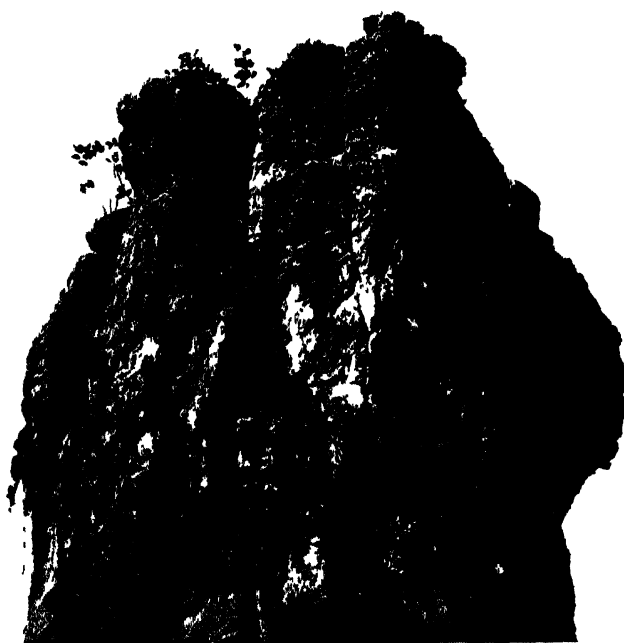


PLATE 2

H. C. Robinson. Photo.

BIRD ROCK, SRI BUA.



FIG. 1

PULAU TINGGI, WESTERN SIDE



FIG. 2

H. C. Robinson Photo

N.E. POINT, WESTERN ISLAND, SRI BUAT.



FIG. 1

KEDAH PEAK FROM GURUN, EAST SIDE.



FIG. 2

C. J. den Kloss. Pl. I.

FIAL RIDGE KEDAH PEAK, 3300 FT.



Fig. 1

SUMMIT OF KEDAH PEAK 3976 FT.

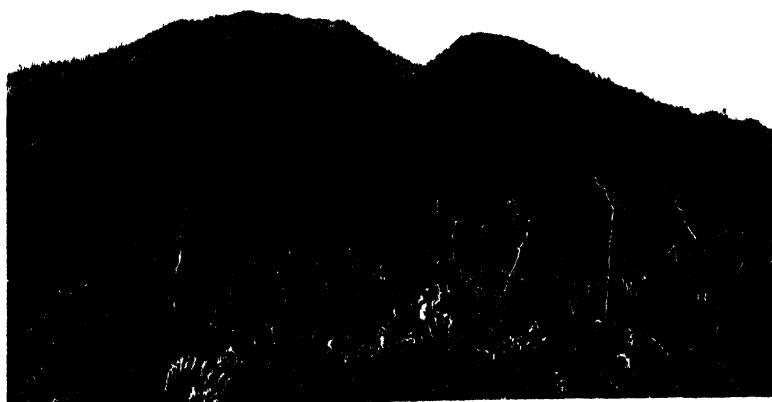


Fig. 2

Fig. 2

RIDGE DESCENDING SW FROM SUMMIT OF KEDAH PEAK



SAKAI COMMUNAL HOUSE, BUKIT DAPOH ULU KINTA PERAK.

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